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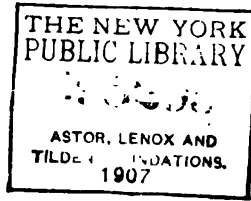
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from Persia and Assyria, and associated with the worship of Cybele, a symbol which is continued in the later coinage of Miletus. Types of this kind were succeeded by portraits of protecting deities. The earliest coins of Athens have the owl, as type of the goddess Athene; at a later period, the head of the goddess herself takes its place, the owl afterwards re-appearing on the reverse. The punch-mark, at first a rudely-roughed square, soon assumed the more slightly form of deep, wedge-like indents, which in later specimens become more regular, till they form themselves into a tolerably symmetrical square. In the next stage, the indents become shallower, and consist of four squares forming one large one.

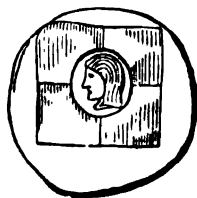


Fig. 2.

The surrounding of the punch-mark with a band bearing a name, and the introduction of a head in its centre, as in the annexed figure (fig. 2), gradually led to the perfect reverse. There is a remarkable series of so-called 'encased' coins struck in Magna Græcia, of which the reverse is an exact repetition in concave of the relief of the obverse. These coins are thin, flat, sharp in relief, and beautifully executed.

The leading coin of Greece and the Greek colonies was the stater, so called because founded on a standard of weight generally received before the introduction of coined money. There were double staters, and half, third, and quarter staters, and the stater was equivalent in value to six of the silver pieces called drachmæ. The obolus was one-sixth of the drachma, at first struck in silver, in later times in copper.

The inscriptions on the earliest Greek coins consist of a single letter, the initial of the city where they were struck. The remaining letters, or a portion of them, were afterwards added, the name, when in full, being in the genitive case. Monograms sometimes occur in addition to the name, or part name, of the place. The first coin bearing the name of a king is the tetradrachm (or piece of four drachmæ) of Alexander I. of Macedon.

Among the early coins of Asia, one of the most celebrated is the stater Darius or Daric, named from Darius Hystaspes. It had for symbol an archer kneeling on one knee, and seems to have been coined for the Greek colonies of Asia by their Persian conquerors. In the reign of Philip of Macedon, the coinage of Greece had attained its full development, having a perfect reverse. One of the earliest specimens of the complete coin is a beautiful medal struck at Syracuse, with the head of

on the reverse of the staters of Philip of Macedon, known as Philipps, and largely imitated by other states. Coins of Alexander the Great are abundant, many having been struck after his conquests in the Greek towns of Asia. A rose distinguishes those struck at Rhodes, a bee those struck at Ephesus, &c.; these are all types generally accompanying the figure of Zeus on the reverse; on the obverse is the head of Hercules, which has sometimes been supposed to be that of Alexander himself. It would rather seem, however, that the conqueror's immediate successors were the first who placed their portrait on the coins, and that under a shallow pretence of deification, Lysimachus as a descendant of Bacchus, and Seleucus of Apollo, clothed in the attributes of these deities. Two most beautiful and important series of Greek coins are those of the Seleucids, in Asia, of silver, and of the Lagids or Ptolemies, in Egypt, of gold.

In Palestine there is an interesting series of coins founded on the religious history of the Jewish nation, and assigned to Simon Maccabæus. They are shekels and half-shekels, equivalent to two Attic drachmæ and one drachma respectively. The shekels bear on the obverse the pot of manna, with the inscription 'Shekel Israel' (the Shekel of Israel); on the reverse is Aaron's rod with three flowers, and the legend 'Ierouschalim kedoschah' (Jerusalem the Holy). The inscriptions are in the Samaritan character. The successors of Simon assumed the title of king, and placed their portraits on the coins, with inscriptions in Greek as well as in Hebrew.

Roman coins belong to three different series, known as the Republican, the Family, and the Imperial.

The so-called Republican, the earliest coinage, began at an early period of Roman history, and subsisted till about 80 B.C. Its standard metal was copper, or rather *æs* or bronze, an alloy of

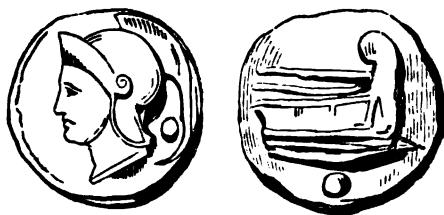


Fig. 4.

copper. The standard unit was the poundweight divided into twelve ounces. The *æs*, or *as*, or pound of bronze, is said to have received a state impress as early as the reign of Servius Tullius, 578 B.C. This gigantic piece was oblong like a brick, and stamped with the representation of an ox or sheep, whence the word *pecunia*, from *pecus*, cattle. The full pound of the *as* was gradually reduced, always retaining the twelve (nominally) uncial subdivisions, till its actual weight came to be no more than a quarter of an ounce. About the time when the *as* had diminished to nine ounces, the square form was exchanged for the circular. This large copper coin, called the '*as grave*,' was not struck with the punch, but cast, and exhibited on the obverse the Janus bifrons; and on the reverse, the prow of a ship, with the numeral I. Of the fractions of the *as*, the sextans, or sixth part, generally bears the head of Mercury, and the uncia, or ounce piece (fig. 4), that of Minerva; these pieces being further



Fig. 3.

Proserpine accompanied by dolphins, and for reverse a victor in the Olympic games in a chariot receiving a wreath from Victory—a type which is also found

Germany and other parts of Europe a thin piece called a bracteate, in relief on one side, and hollow on the other, often not bearing a single letter, and rarely a full inscription. Down to the 14th c. the relief of the mediæval coins is very inconsiderable, the pieces thin, and the art poor.

Britain received the Roman money on its subjugation. Constantine seems to have had a mint in London, and the Roman currency continued to circulate for a time after the departure of the conquerors. The first independent coinage, however, shews hardly a trace of the influence of Rome; it consists of two small coins, called the *skettas* and *styca*, the former of silver, the latter of copper. Both seem to belong solely to the Saxon kingdom of Northumbria; they are without inscriptions; a bird, a rude profile, and several unintelligible symbols appear on them, and their art is of the most debased kind. In the other kingdoms of the heptarchy silver pennies were coined, first intended to be $\frac{1}{12}$ th of a pound weight; on the disappearance of *skettas* and *styca*, they form, with the occasional addition of halfpennies, the sole currency of England down to the reign of Edward III. The pennies of the heptarchy bear the name of the king or of the moneyer; a cross sometimes appears after the introduction of Christianity, and in later times a rude head of the king or queen. The pennies of the Saxon and Danish sole monarchs of England, have a somewhat similar character. Alfred's earlier coins have a grotesque-looking portrait, and on the reverse

Fig. 5.

a monogram of London; in his later coins the head disappears, and a cross and circle take its place. A cross, variously ornamented with three pellets in each angle, continues to be the usual reverse of the Saxon, Norman, and Plantagenet coins. The coins of Edward III. are a great artistic advance on those that preceded them. The silver coinage of that king consisted not only of pennies, halfpennies, and farthings, but also of groats and half-groats. The obverse of the groat bears a conventional crowned head within a flowered circle of nine arches, the words 'Dei Gratia' and the title 'Rex Francie' appearing for the first time in the legend. The reverse has the motto 'Posui Deum adiutorem meum,' which continued on the coinage till the time of Edward V. But the great numismatic feature of Edward III.'s reign is the issue of gold nobles, worth six shillings and eightpence. The obverse of these beautiful coins represent the king in a ship, a sword in his right hand, in his left a shield with the quartered arms of France and England. The reverse is a rich cross fleury within a circle of eight arches, and a lion under a crown in each angle of the cross, the legend being 'Ihesus autem transiens per medium illorum ibat.' Half and quarter nobles were also coined. The noble having increased in value, a coin called an angel, of the former value of a noble, was issued by Henry VI. and Edward IV. The obverse represented St Michael transfixing a dragon; the reverse a ship, with a cross for the mast.

As we approach the period of the Reformation, the coinage gradually becomes more ornate. The nobles coined by Edward IV., after the value

of that coin had been fixed at ten shillings, were called *rials* (a name derived from a French coin), and the double rial or sovereign was first coined by Henry VII. The obverse has the king on his throne with sceptre and orb, and on the reverse, in the centre of a heraldic full-blown rose, is a shield with the arms of France and England. The testoon, or shilling, valued at twelve pence, also first appeared in this reign, with the royal profile crowned on the obverse, and the royal arms quartered by the cross on the reverse. A great debasement of the coinage took place in the reign of Henry VIII. The reverse of the farthings of that monarch bears a portcullis, that of the shillings a rose surmounted by a crown, and of the sovereigns, the royal arms supported by a lion and dragon. A noble was coined with St George and the dragon on the obverse, and on the reverse a ship with three crosses for masts, and a rose on the centre mast. On the coins of Henry VIII. the title 'Hibernie Rex' first appeared, former kings having only styled themselves 'Dominus Hibernie,' Ireland not being accounted a kingdom. Under Edward VI. the silver coins called crowns and half-crowns appear, having for device the king crowned on horseback in the armour of the period. They derived their name from coins circulating on the continent, which had for device a crown. The royal arms in an oval shield without the cross are introduced as the reverse of the shilling. From this period there is a very obvious decline in the artistic feeling of the English coins. On some of the shillings of Mary, her bust and that of Philip face each other, the insignia of Spain and England impaled occupying the reverse; afterwards the king's head occupies one side of the coin, and the queen's the other. Half-sovereigns, or rials, and angels were coined of the old type of Edward IV. The great event in the coinage of Elizabeth's reign was the temporary introduction of the mill and screw, instead of the hammer and punch, producing coins of a more regular and workmanlike appearance. The profile bust of James I. crowned and in armour, appears on his shillings and smaller pieces; on his crowns and half-crowns he is represented on horseback; on the reverse are the quartered arms of the three kingdoms (the harp of Ireland appearing for the first time on the coinage), with the motto 'Que Deus coniunxit nemo separat.' Copper farthings, with crown, sceptre, and sword on the obverse, and a harp on the reverse, were coined for England as well as Ireland, the first copper money issued in England since the *styca*. Private tokens of copper, issued by tradesmen and others, had, however, been in circulation before, and came again into use to a large extent at a later period. Charles I. coined ten and twenty shilling pieces of silver, the former a very noble coin, with a representation of the king on horseback. A crown, struck at Oxford, bears on the obverse the king on horseback, with a representation of the town, and on the reverse the heads of the Oxford declaration. The guinea, first coined in this reign, was so called from the metal being procured from the coast of Guinea; its original value was but twenty shillings.

The coins of the Commonwealth exhibit a shield with the cross of St George surrounded by a palm and olive branch, and have for legend 'The Commonwealth of England.' On the reverse are two shields accolée, with the cross of St George and the harp of Ireland, and the motto 'God with us.' Coins far superior in character were executed by Cromwell, with his laureated bust and title as Protector, and on the reverse a crowned shield quartering the cross of St George, of St Andrew and the harp, with the Protector's paternal arms in surcoat; but few of these were issued. In the early

however, there are vigorous portraits both on its current coins and on the medals, and those double dollars which are virtually medals. The coins of the Dukes of Saxony, with their portraits, are equally remarkable. The coins of the archbishops of Cologne, Mainz, and Treves form a very interesting series, the first more especially, with a representation of the cathedral.

The coins of the Low Countries resemble those of France and Germany. The Dutch medals are of interest, more especially those struck in commemoration of events in the war with Spain.

The coins of the Swiss cantons and towns during the early period of Swiss independence bore the heraldic shield of each, drawn with vigorous grotesqueness. There are also pieces struck by ecclesiastical lords, and by different families who had a right of coinage.

The coins of Spain begin with those of the Gothic princes, which are chiefly of gold, and on the model of the trientes and semisses of the lower empire. Some of the early pieces have a rude head of the monarch on one side, and of the emperor on the other. Afterwards, the obverse bears the profile of the monarch, and the reverse a cross of some description, with the name of the place of mintage, and the word 'Pius' for legend. In later times, there are two interesting series of coins belonging to the kingdom of Aragon and to the kingdom of Castile and Leon.

The coinages of Norway and Sweden at first resembled the British, and afterwards the German type. From the 10th to the 14th c., bracteates were issued by the ecclesiastics. The coinage of Hungary begins in the 11th c., and has the portraits of the monarchs. The Russian coinage is Byzantine in character, and rude in its art. The earliest pieces are the silver darga of the 14th c., of an oblong shape, with representations of the prince on horseback, and various legendary subjects. Peter the Great introduced the usual European type. There is an important series of bronze coins of the Crusaders, beginning with Tancred, and coming down to the end of the 15th c., including money of the kings of Cyprus and Jerusalem, and other princes established in the east.

In India, the succession of the kings of Bactria, the remotest of the dynasties founded on the ruins of Alexander's empire, has only become known through their recently-discovered coins. There are early rude Hindu coins of the Gupta line, with figures of the Brahminical divinities of a type still in use.

Of the coins of the Mohammedan princes, the oldest gold pieces are the bilingual coins of cities of Syria and Palestine, of the middle of the 7th c. (A. H. 78), barbarous imitations of the latest Byzantine money of Alexandria. Most of the Mohammedan coins are covered exclusively by inscriptions expressive of the elementary principles of the Mohammedan faith. For some centuries, no sovereign except the calif was allowed to inscribe his name on the coin. Large gold coins of great purity were issued by the Moslem kings of Granada in Spain.

The high prices given for ancient coins have led to numerous forgeries from the 15th c. downwards. Against such imitations, collectors require to be on their guard.

Among the best works on numismatics are Eckhel, *Doctrina Numorum Veterum* (Vienna, 1792—1798); Hennen, *Manuel de Numismatique Ancienne* (Paris, 1830); Grasset, *Handbuch der alten Numismatik* (Leipzig, 1852—1853); Leake, *Numismata Hellenica* (London, 1854); Ruding's *Annals of*

the Coinage of Great Britain (London, 1840); Lindsay's *View of the Coinage of Scotland* (Cork, 1845); Leblanc, *Traité Historique des Monnoies de France* (Paris, 1690); Cappe, *Die Münzen der Deutschen Kaiser und Könige des Mittelalters* (Dresden, 1848—1850); Marsden, *Numismata Orientalia Illustrata* (London, 1823—1825).

NUMMULITE LIMESTONE, an important member of the Middle Eocene period, consisting of a limestone composed of nummulites held together by a matrix formed of the comminuted particles of their shells, and of smaller foraminifera. It forms immense masses of the strata which are raised up on the sides of the Alps and Himalayas, and may be traced as a broad band often 1800 miles in breadth, and frequently of enormous thickness, from the Atlantic shores of Europe and Africa, through Western Asia, to Northern India and China. It is known also to cover vast areas in North America.

NUMMULITES, or **NUMMULINA** (Gr. money-fossil), a genus of fossil foraminifera, the shells of which form immense masses of rock of Eocene age. See **NUMMULITE LIMESTONE**. Upwards of 50 species have been described. They are circular bodies of a lenticular shape, varying in magnitude from the merest point to the size of a crown-piece. The shell is composed of a series of small chambers arranged in a concentric manner. The growth of the shell does not take place only around the circumference, but each whorl invests all the preceding whorls, so as to form a new layer over the entire surface of the disk, thus adding to the thickness as well as the breadth, and giving the fossil its lenticular form. A thin intervening space separates each layer from the one which it covers, and this space at the margin swells out to form the chamber. All the internal cavities, however, seem to have been occupied with the living sarcode, and an intimate connection was maintained between them by means of innumerable parallel tubuli, which everywhere pass from one surface to another, and which permitted the passage of the sarcode as freely as do the minute pores or foramina of the living foraminifera.

The name is given to them from their resemblance to coins. In Egypt, where the whole of the Mokkadame Mountains, from the stone of which the pyramids were built, is formed of them, they are called by the natives 'Pharaoh's Pence.'

NUN, a member of a religious order of women. The etymology of this name is a subject of some controversy, but there seems every reason to believe that it is from a Coptic or Egyptian root, which signifies 'virgin.' It is found in use as a Latin word as early as the time of St Jerome (*Ep. to Eustachius*, p. 22, c. 6). The general characteristics of the religious orders will be found under the head **MONACHISM** (q. v.), and under those of the several orders. It is only necessary here to specify a few particulars peculiar to the religious orders of females. Of these the most striking perhaps is the strictness in the regularly authorised orders of nuns of the 'cloister,' or enclosure, which no extern is ever permitted to enter, and beyond which the nuns are never permitted to pass, without express leave of the bishop. The superiors of convents of nuns are called by the names Abbess, Prioress, and, in general, Mother Superior. They are, ordinarily speaking, elected by chapters of their own body, with the approval of the bishop, unless the convent be one of the class called exempt houses, which are immediately subject to the authority of the Holy See. The ceremony of the solemn blessing or inauguration of the abbess is reserved to the bishop, or

exquisite wood-carvings of Veit Stoss; St Sebald's, with its numerous fine glass-paintings and frescoes by Peter Vischer and other German masters; the cathedral, or Our Lady's, built in 1631, similarly enriched. N. is well provided with educational establishments, and besides a good gymnasium and polytechnic institution, has good schools of art, normal and other training colleges, a public library of 50,000 vols., galleries of art collections, museums, &c.; while the numerous institutions of benevolence are liberally endowed and well maintained. Although the glory of the foreign commerce of N. may be said to have been long extinct, its home trade, which is still of considerable importance, includes the specialties of metal, wood and bone carvings, and children's toys and dolls, which find a ready sale in every part of Europe, and are largely exported to America and the East. In addition to its own industrial commerce, is the seat of a large transfer and exchange business, which owes much of its importance to the facilities of intercommunication afforded by the net-work of railway lines with which the city is connected.

N. was raised to the rank of a free imperial city by the Emperor Henry V., in 1219, previous to which time, Henry IV. had ennobled 38 of the principal burgher families, who forthwith arrogated to themselves supreme power over the N. territory. In the 13th c. we find it under the title of a burgraviate in the hands of the Hohenzollern family, who, in 1417, ceded for a sum of money all their territorial and manorial rights to the magistracy of the city. This measure put a stop to the feuds which had hitherto raged between the burgraves and the municipality, and for a time N. continued to grow rich with the fruits of the great internal trade, which it had long maintained between the traders of the East and the other European marts of commerce. The discovery of the passage by the Cape of Good Hope, by opening new channels of communication between Asia and Europe, deprived N. of its ancient monopoly. The Thirty Years' War completed the decay of the city, which suffered severely from both parties in turn. The ancient reputation of N. as a wealthy and loyal city of Germany secured to it, however, special consideration; and in 1806, when the imperial commissioners re-organized some of the dismembered parts of the old empire, it was allowed to retain its independence, with a territory of 483 square miles, containing 40,000 inhabitants, and drawing a revenue of 800,000 gulden; but in consequence of the disputes in which the free city became involved with the king of Prussia, who had some hereditary claim on the ancient burgraviate, N., alarmed at the prospect of still greater embarrassments, entered into the Rhenish Confederation, and as the result of this alliance, was transferred, in 1806, with the surrender of its entire domain and all rights of sovereignty, to the king of Bavaria.

NURSE, MILITARY. In continental armies, the 'sisters of charity' usually carry their mission of mercy into the military hospitals. Protestant England having no such organisation to fall back upon, the soldiers have been dependent on the regular male hospital attendants for their care during sickness, or when suffering from wounds. The Crimean campaign, however, disclosed so melancholy a picture of the want of women's co-operation, that a band of self-sacrificing ladies, headed by Miss Nightingale (q. v.), proceeded to Turkey, and were soon acknowledged as messengers of health and life by the unfortunate wounded. This experience has been turned to account, and a staff of female nurses has been organised, under the control of a lady styled the Superintendent General of Army

Nurses, who take care of the sick in their wards in Military Hospitals.

NURSERY, a garden or portion of a garden devoted to the raising of young plants, to be afterwards planted elsewhere. The ripening of garden-seeds for sale is generally also an important part of the trade of the public nurseryman. Many culinary vegetables are very commonly raised from seed in public nurseries, and sold as young plants; the trouble of raising them in small gardens being found too great, although, when there is no public nursery at hand, even the cottage-gardener may be compelled to undertake this trouble for himself, in order to procure a supply of young kale, cabbage, cauliflower, &c., in fresh and healthful condition. Many flowering plants, as wallflower, stock, sweet-william, &c., are also raised and sold by nurserymen. Another great use of the nursery is the rearing of fruit-trees. In the nursery, the stocks are raised from seed, the grafting is performed, and the training of the young tree, whether for standard, espalier, or wall tree, is begun. As, with regard to fruit-trees, the selection of grafts is of the utmost importance, the reputation of the nurseryman is particularly to be considered by the purchaser; nor is there any trade in which this is more generally necessary, months, or sometimes years elapsing, before the quality of the goods purchased can be experimentally ascertained. The principal, and many of the smaller towns of Britain are well supplied with public nurseries, which is the case also in many countries of continental Europe and in North America. Some of these nurseries are on a very great scale, as those of Messrs Loddige of London, Lawson of Edinburgh, and Booth of Hamburg. The largest nurseries, however, are very much devoted to the rearing of ornamental shrubs and trees, and of forest-trees. Plantations of forest-trees, even when very extensive, are now generally, although not always, made with plants obtained from public nurseries. The exertions made by nurserymen to obtain new plants from foreign countries, have contributed much, not only to the advancement of gardening in its various departments, and of arboriculture, but also of botany.—Much benefit also results from the exchange of the produce of the nurseries of different countries. Thus, bulbous roots are brought to Britain from Holland, from what may be described as nurseries specially devoted to them; roses and orange-trees are imported from the nurseries of France, &c. It often happens that seeds imported from climates more thoroughly adapted to the plants, produce better crops than those raised in a colder climate or under a cloudier sky.

NUT, in popular language, is the name given to all those fruits which have the seed enclosed in a bony, woody, or leathery pericarp, not opening when ripe. Amongst the best known and most valuable nuts are the Hazel-nut, Brazil nut, Walnut, Chestnut, and Cocoa-nut, all of which are edible. Other nuts are used in medicine, and for purposes connected with the arts. Some of the edible nuts abound in a bland oil, which is used for various purposes.—In Botany, the term nut (*nut*) is used to designate a one-celled fruit, with a hardened pericarp, containing, when mature, only one seed. The *Achenium* (q. v.) was by the older botanists generally included in this term. Some of the fruits to which it is popularly applied scarcely receive it as their popular designation. The hazel-nut is an excellent example of the true nut of botanists.—The name nut, without distinctive prefix, is popularly given in Britain to the hazel-nut, but in many parts of Europe to the walnut.

NUTMEG—NUTRITION.

of bark or other such situation, and peck at it until the shell is broken, so placing themselves that they sway not merely the head, but the whole body, to give force to the stroke. The English name is said to have been originally *Nut-Ack*. One species, the EUROPEAN N. (*S. Europæa*), is common in most parts of Europe, and is found in most of the wooded districts of England. Its whole length is about six inches. If taken young, it is easily tamed, and becomes very familiar and amusing; but an old bird caught and put into a cage, is apt to kill itself by violently pecking to force a way out. It soon destroys the wood of a cage.—Other species are found in the East and in North America, where the genus is particularly abundant. Birds nearly allied are found in Australia.

NUTMEG. This well-known and favourite spice is the kernel mostly consisting of the albumen—of the fruit of several species of *Myristica*. This genus belongs to a natural order of exogens called *Myristicaceæ*, which contains about forty species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. They generally have red juice, or a juice which becomes red on exposure to air. The order is allied to *Lauraceæ*. The leaves are alternate and without stipules. The flowers are unisexual, the perianth generally trifid, the filaments united into a column. The fruit is succulent, yet opens like a capsule by two valves. The seed is nut-like, covered with a laciniated fleshy aril, and has an albumen penetrated by its membranous covering. The species of this order are generally more or less aromatic in all their parts; their juice is styptic and somewhat acrid; the albumen and aril contain both a fixed and an essential oil, and those of some species are used as spices. The genus *Myristica* has the anthers united in a cylindrical

preserved and eaten as a sweetmeat. Within is the nut, enveloped in the curious yellowish-red aril, the *Mace* (q. v.), under which is a thin shining brown shell, slightly grooved by the pressure of the mace, and within is the kernel or nutmeg. Up to 1796, the Dutch being the possessors of the Banda Isles, jealously prevented the N. from being carried in a living state to any other place; but during the conquest and retention of the islands by the British, care was taken to spread the culture of this valuable spice, and plants were sent to Penang, India, and other places, where they are now successfully cultivated; indeed, they have now become established in the West India Islands, and both Jamaica and Trinidad produce excellent nutmegs. Brazil is also found favourable to their culture. The N. is very liable to the attack of a beetle, which is very destructive, and it is a common practice to give them a coating of lime before shipping them to Europe, in order to protect them from its ravages. The Dutch or Batavian nutmegs are nearly always limed, but those from Penang are not, and are consequently of a greater value. The N. yields, by expression, a peculiar yellow fat, called oil of mace, because, from its colour and flavour, it was generally supposed to be derived from mace; and by distillation is obtained an almost colourless essential oil, which has very fully the flavour of the nutmeg. Her own settlements now furnish Great Britain with the greater portion of this spice, but some lots of Batavian also come into the market. The quantity imported last year was nearly 300,000 pounds' weight, worth, in round numbers, £70,000.

Nutmegs are chiefly used as a spice; but medicinally they are stimulant and carminative. They possess narcotic properties, and in large doses produce stupefaction and delirium, so that they ought not to be used where affections of the brain exist or are apprehended.

Other species of *Myristica*, besides those already named, yield nutmegs sometimes used, but of very inferior quality.—The fruits of several species of *Lauraceæ* also resemble nutmegs in their aromatic and other properties; as the cotyledons of *Nectandra Puchury*, the Pisharim Beans of Commerce, and the fruit of *Acrodictidium camara*, a tree of Guiana, the Camara or Ackawai nutmeg. The clove nutmegs of Madagascar are the fruit of *Agathophyllum aromaticum*, and the Brazilian nutmegs of *Cryptocarya moschata*. All these belong to the order *Lauraceæ*. The Calabash N. is the fruit of *Monodora myristica*, of the natural order *Anonaceæ*.

NUTRIA. See COYPU and RACOONDA.

NUTRITION. The blood which is carried by the capillaries to the several tissues of the body is the source from whence all the organs derive the materials of their growth and development; and it is found that there is direct proportion between the vascularity of any part and the activity of the nutrient operations which take place in it. Thus, in nervous tissue and muscle, in mucous membrane and in skin, a rapid decay and renovation of tissue are constantly going on, and these are parts in which the capillaries are the most abundant; while in cartilage and bone, tendon and ligament, the disintegration of tissue is comparatively slow, and the capillaries are much less abundant. Each elementary cell or particle of a tissue seems to have a sort of gland-like power not only of attracting materials from the blood, but of causing them to assume its structure, and participate in its properties. Thus, from the same common source, nerves form nervous tissue, muscles muscular substance, and even morbid growths, such as cancer, have an assimilating power.

Nutmeg (*Myristica moschata*):

A branch showing fruit, and section of fruit, with nutmeg enclosed.

column, and the cotyledons folded. The species which furnishes the greater part of the nutmegs of commerce is *M. fragrans* or *moschata*; but the long N. (*M. fatua*), from the Banda Isles, is now not uncommon in our markets. The common N.-tree is about 25 feet in height, with oblong leaves, and axillary few-flowered racemes; the fruit is of the size and appearance of a roundish pear, golden yellow in colour when ripe. The fleshy part of the fruit is rather hard, and is of a peculiar consistence, resembling candied fruit; it is often

readily adduced to prove that a certain influence of the nervous system is essential to healthy nutrition. Injuries of the spinal cord are not unfrequently followed by mortification of portions of the paralysed parts; and both experiments and clinical cases shew that the repair of injuries takes place less completely in parts paralysed by lesion of the spinal cord than in ordinary cases. Division of the trunk of the trifacial nerve has been followed by incomplete nutrition of the corresponding side of the face, and ulceration of the cornea is a frequent consequence of the operation.

4. The fourth condition is so obvious as to require no special illustration.

For further information on this most important department of physiology, the reader is referred to Mr Paget's *Surgical Pathology*, or to his original lectures on Nutrition, Hypertrophy, and Atrophy (published in volume 39 of *The Medical Gazette*), or to the chapter on 'Nutrition and Growth,' in Kirkes's *Handbook of Physiology*, which contains an excellent abstract of Mr Paget's views, and to which we are indebted for the greater part of this article.

NUX VOMICA is the pharmacopœial name of the seed of *Strychnos Nux Vomica*, or *Poison Nut*. The following are the characters of these seeds, which are imported from the East Indies: 'Nearly circular and flat, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray colour, thickly covered with short satiny hairs, internally translucent, tough and horny, taste intensely bitter, inodorous.'—*The British Pharmacopœia*, p. 99.

For the genuine characters, see the article *Strychnos*.—The N. V. tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbæ. The fruit is a globular berry, about as large as a small

poison on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids or bases are named *Strychnia*, *Brucea*, and *Igasuria*, and exist in the seeds in combination with lactic and strychnic (or igasuric) acid. For a good method of obtaining pure strychnia, which is by far the most important of the three bases, the reader is referred to p. 328 of *The British Pharmacopœia*.

Strychnia ($C_{12}H_{17}N_3O_8$) occurs 'in right square octohedrons or prisms, colourless and inodorous, scarcely soluble in water, but easily soluble in boiling rectified spirit, in ether, and in chloroform. Pure sulphuric acid forms with it a colourless solution, which, on the addition of bichromate of potash, acquires an intensely violet hue, speedily passing through red to yellow.'—*Op. cit.* In nitric acid, it ought, if pure, to form a colourless solution; if the solution is reddish, it is a sign that brucia is also present. Strychnia combines with numerous acids, and forms well-marked salts, which are amenable to the same tests as the base itself.

Brucea ($C_{14}H_{21}N_3O_8 + 8 Aq$) is insoluble in ether, but more soluble in water and in strong alcohol than strychnia; and it is the most abundant of the three alkaloids in nux vomica. It acts on the animal economy similarly to, but much less actively than strychnia, from which it may be distinguished not only by its different solubility, but by the red colour which is imparted to it by nitric acid, and which changes to a fine violet on the addition of protochloride of tin. Like strychnia, it forms numerous salts.

Igasuria seems closely to resemble brucia in most respects. Little is known regarding *Igasuric Acid*.

Strychnia, brucia, and igasuria occur not only in nux vomica but in the seeds of *Strychnos ignatii* (St Ignatius's beans), and in the seeds and other parts of several plants of the genus *Strychnos*. The amount of strychnia present in these substances varies from 0.5 to 1.5 per cent.

Nux vomica, according to the experiments of Marcet, acts on vegetables as a poison. His experiments were, however, confined to the haricot bean and the lilac. It is poisonous in a greater or lesser degree to most animals, though larger quantities are required to kill herbivorous than carnivorous animals. Thus, a few grains will kill a dog, but some ounces are required to destroy a horse. It is believed, however, that the bird called *Buceros Rhinoceros* eats the nuts with impunity; and a peculiar kind of *Acerus* lives and thrives in the extract of the nuts. Dr Pereira describes three degrees of the operation of this substance on man. 1. In very small doses, its effects are tonic and diuretic, and often slightly aperient. 2. In larger doses, there is a disordered state of the muscular system; the limbs tremble; a slight rigidity or stiffness is felt when an attempt is made to put the muscles in action; and the patient experiences a difficulty in keeping the erect posture. If the use of the medicine be continued, these effects increase in intensity, and the voluntary muscles are thrown into a convulsed state by very slight causes, as, for example, by inspiring more deeply than usual, or even by turning in bed. It is remarkable that in paralysis the effects are most marked in the paralysed parts. 3. In poisonous doses, the symptoms are tetanus and asphyxia, followed by death. After swallowing a large dose of strychnia (on which the poisonous effects of nux vomica essentially depend), the following phenomena occurred in a case recorded by Taylor in his *Medical Jurisprudence*: 'A young man, aged seventeen, swallowed forty grains of strychnia. The symptoms came on in about a quarter of an hour; lock-jaw and

Nux Vomica:

Branchlet, Leaves, and Flowers.

orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp.—The bark is known as *False Angostura Bark*, having been confounded with Angostura Bark, in consequence of a commercial fraud, about the beginning of the present c.; but its properties are very different, as it is very poisonous.

The seeds contain (in addition to inert matters, such as gum, starch, woody fibre, &c.) three alkaloids closely related to each other, which act as powerful

or apprehension (*upalabdhi*), or conception (*jñāna*), terms which are used synonymously. It is not eternal, as the Sāṅkhya maintains, but transitory. *f. The organ of imagination and volition (manas)*. Its property is the not giving rise simultaneously to more notions than one. *g. Activity (pravṛtti)*, or that which originates the utterances of the voice, the cognitions of the understanding, and the gestures of the body. It is therefore oral, mental, or corporeal, and the reason of all worldly proceedings. *h. Faults or failings (doṣa)*, which cause activity—viz. affection, aversion, and bewilderment. *i. Transmigration (pretyabhāva)*, literally, the becoming born after having died), or the regeneration of the soul, which commences with one's first birth, and ends only with final emancipation. It does not belong to the body, because the latter is different in successive births, but to the soul, because it is eternal. *k. Fruit or retribution (phala)*, or that which accrues from activity and failings. It is the consciousness of pleasure or of pain. *l. Pain (duḥkha)*, or that which has the characteristic mark of causing vexation. It is defined as 'the occurrence of birth,' or the originating of 'body,' since body is associated with various kinds of distress. Pleasure is not denied to exist, but, according to the Nyāya, it deserves little consideration, since it is ever closely connected with pain. *m. Absolute deliverance or emancipation (apavarga)*. It is annihilation of pain, or absolute cessation of one's troubles once for all.

After (1) 'instruments of right notion,' and (2) 'the objects of inquiry,' the Nyāya proceeds to the investigation of the following topics.

3. Doubt (saṁśaya). It arises from unsteadiness in the recognition or non-recognition of some mark, which, if we were sure of its presence or absence, would determine the subject to be so or so, or not to be so or so; but it may also arise from conflicting testimony. *4. Motive (prajñāna)*, or that by which a person is moved to action. *5. A familiar case (dṛśāntānta)*, or that in regard to which a man of an ordinary and a man of a superior intellect entertain the same opinion. *6. Tenet or dogma (mādhānta)*. It is either 'a tenet of all schools,' i.e. universally acknowledged, or 'a tenet peculiar to some school,' i.e. partially acknowledged; or 'a hypothetical dogma,' i.e. one which rests on the supposed truth of another dogma; or 'an implied dogma,' i.e. one the correctness of which is not expressly proved, but tacitly admitted by the Nyāya. *7. The different members (anvaya)* of a regular argument or syllogism (*nigama*). *8. Confutation or reduction to absurdity (tarka)*. It consists in directing a person who does not apprehend the force of the argument as first presented to him, to look at it from an opposite point of view. *9. Determination (nirṇaya)*. It is the determination of a question by hearing both what is to be said for and against it, after having been in doubt. The three next topics relate to the topic of controversy, viz. *10. Discussion (vāda)*, which is defined as consisting in the defending by proofs on the part of the one disputant, and the controverting it by objections on the part of the other, without disavowance in respect of the principles on which the conclusion is to depend; it is, in short, an honest sort of discussion, such, for instance, as takes place between a preceptor and his pupil, and where the debate is conducted without ambition of victory. *11. Wrangling (japa)*, consisting in the defence or attack of a proposition by means of tricks, subtleties, and such like means; it is therefore a kind of discussion where the disputants are merely desirous of victory, instead of being desirous of truth. *12. Cavilling*

(*vāda*), when a man does not attempt to establish the opposite side of the question, but confines himself to carping disingenuously at the arguments of the other party. *13. Fallacies*, or semblances of reasons (*hetvābhāsa*), five sorts of which are distinguished, viz. the erratic, the contradictory, the equally available on both sides, that which, standing itself in the need of proof, does not differ from that which is to be proved, and that which is adduced when the time is not that when it might have availed. *14. Tricks*, or unfairness in disputation (*chāla*), or the opposing of a proposition by means of assuming a different sense from that which the objector well knows the propounder intended to convey by his terms. It is distinguished as verbal misconstruing of what is ambiguous, as perverting, in a literal sense, what is said in a metaphorical one, and as generalising what is particular. *15. Futile objections (jāti)*, of which twenty-four sorts are enumerated; and, *16. Failure in argument or reason of defeat (nigraha-sādhana)*, of which twenty-two distinctions are specified.

The great prominence given by the Nyāya to the method, by means of which truth might be ascertained, has sometimes misled European writers into the belief, that it is merely a system of formal logic, not engaged in metaphysical investigations. But though the foregoing enumeration of the topics treated by it could only touch upon the main points which form the subject-matter of the Nyāya, it will sufficiently shew that the Nyāya intended to be a complete system of philosophical investigation; and some questions, such as the nature of intellect, articulated sound, &c., or those of genus, variety, and individual, it has dealt with in a masterly manner, well deserving the notice of western speculation. That the atomistic theory has been devolved from it, will be seen under the article VAIŚEṢIKA. On account of the prominent position, however, which the method of discussion holds in this system, and the frequent allusion made by European writers to a Hindu syllogism, it will be expedient to explain how the Nyāya defines the 'different members of a syllogism' under its seventh topic. A regular argument consists, according to it, of five members—viz. *a. the proposition (pratijñā)*, or the declaration of what is to be established; *b. the reason (hetu)*, or 'the means for the establishing of what is to be established'; *c. the example (ūpādhāna)*, i.e. some familiar case illustrating the fact to be established, or inversely, some familiar case illustrating the impossibility of the contrary fact; *d. the application (upanaya)*, or 're-statement of that in respect of which something is to be established'; and *e. the conclusion (nigama)*, or 'the re-stating of the proposition because of the mention of the reason.' An instance of such a syllogism would run accordingly thus: *a. This hill is fiery, b. for it smokes, c. as a culinary hearth, or (inversely) not as a lake, from which vapour is seen arising, vapour not being smoke, because a lake is invariably devoid of fire; d. accordingly, the hill is smoking; e. therefore, it is fiery.*

The founder of the Nyāya system is reputed under the name of Gotama, or, as it also occurs, Gautama (which would mean a descendant of Gotama). There is, however, nothing as yet known as to the history of this personage or the time when he lived, though it is probable that the work attributed to him is, in its present shape, later than the work of the great grammarian Pāṇini. It consists of five books or *Adhyāya*, each divided into two 'days,' or diurnal lessons, which are again subdivided into sections or topics, each of which contains several aphorisms, or *Sūtra*. See SŪTRA. Like the text-books of other sciences among the

NYCTAGINACEÆ--NYL-GHAU.

India, it has been explained or annotated by a triple set of commentaries, which, in their turn, have become the source of more popular or elementary treatises.—The Sanscrit text of the *Sūtras* of Gotama, with a commentary by *Viśvaśāstra*, has been edited at Calcutta (1829); and the first four books, and part of the fifth, of the text, with an English version, an English commentary, and extracts from the Sanscrit commentary of *Viśvaśāstra*, by the late Dr J. R. Ballantyne (Allahabad, 1850—1854). This excellent English version and commentary, and the celebrated *Essay* on the *Nyāya*, by H. T. Colebrooke (*Transactions of the Royal Asiatic Society*, vol. i. London, 1827; and reprinted in the *Miscellaneous Essays*, vol. i. London, 1837), are the best guide for the European student who, without a knowledge of Sanscrit, would wish to familiarise himself with the *Nyāya* system.

NYCTAGINACEÆ, a natural order of exogenous plants, consisting partly of herbaceous plants, both annual and perennial, and partly of shrubs and trees. Lindley ranks them in his *Chenopodiæ Alliance*. The flowers are either clustered or solitary, and either the cluster or the flower often has an involucre, which is often gaily coloured. The perianth is tabular, plaited in bud, coloured; the limb entire or toothed, deciduous. The stamens are equal in number to the lobes of the perianth. The ovary is superior, with one ovule, and one style. The fruit is a thin *caryopsis*, enclosed within the enlarged and indurated base of the perianth.—There are about 100 known species, natives of warm countries. Some have flowers of considerable beauty, as those of the genus *Mirabilis*, known in our gardens as *Marvel of Peru*, one of which, *M. Jalapa*, was at one time erroneously supposed to produce jalap. The roots of many are fleshy, purgative, and emetic. Those of *Borreria* *paniculata* are used instead of *pecumanha* both in Guiana and in Java.

NYCTERIBIA, an extremely curious genus of insects, ranked in the order *Diptera*, although very different from most of that order, and having neither wings nor balancers. Its nearest alliance is with *Hippoboscidae* (see FOREST FLY and SHEEP TICK), which it resembles particularly in parasitic habits, and in the retention of the eggs within the abdomen of the female, until they have not only been hatched, but have passed from the larva into the pupa state. The form, however, is so spider-like, that these insects were at first ranked among the *Arachnida*. The few species known are all parasitic on bats, on which they run about with great activity. The head is very small, curiously affixed to the back of the thorax, and when the creature sucks the blood of the bat, upon which it lives, it places itself in a reversed position.

NYKERK, or **NIEUWKERK**, on the *Veluwe*, is a very flourishing and well-built town, near the *Zuider Zee*, in the province of Gelderland, Netherlands, 25 miles north-west of Arnheim. Pop. 8000. It has a good harbour, which is connected with the sea by a wide canal of 1½ miles in length. In the neighbourhood are fine rich meadow-pastures and lands suited for all kinds of grain, tobacco, potatoes, &c. Tobacco is extensively grown; many cattle are reared; and a brisk trade carried on both with the surrounding country and Amsterdam, the market to which the cattle, tobacco, dairy, and other agricultural produce, together with much firewood, are sent. N. has a handsome Reformed church, a Roman Catholic chapel, a synagogue, orphan-house, and good schools. There are several manufactures carried on, which also give employment to the people. In Netherlands church history, N. is famed as the place where a great religious move-

ment began at the middle of last century. The history of the movement, which spread throughout the land, contains all the marks of the later revivals in America, Scotland, and Ireland. See Ypey and Dermont's *Geschiedenis der Nederl. Herk.*, vol. iv.

NYKÖPING, a seaport of Sweden, pleasantly situated on the Baltic, in lat. 58° 45' N., long. 17° E., about 60 miles south-west of Stockholm. It comprises among its manufacturing products cotton goods, stockings, tobacco, &c., and has good shipyards, mills, and manufactories for machinery, while in the vicinity of the town are extensive paper-mills. The ruined old castle of N., nearly destroyed by fire in 1663, and which ranked in point of strength next to those of Stockholm and Calmar, has experienced many eventful vicissitudes of fortune. King Valdemar of Sweden, after his dethronement in 1288, was imprisoned here till his death in 1302; but the most tragic incident connected with N. Castle was the horrible death within its walls of the Dukes Eric and Valdemar, who, after being entrapped by their pusillanimous brother, King Birger, in 1317, were left to perish of hunger in a dungeon, the keys of which the king threw into the sea before he left the castle. The horror of this deed roused the indignation of the people, who seized upon the castle, sacked it, and demolished its keep and donjons. In 1719, the town was taken and dismantled by the Russians; and since then it has ceased to be the scene of any events of historical interest. It is noted for the pure Swedish spoken by its inhabitants. Pop. 3956.

NYL-GHAU (*Antelope picta*, or *Portax tragocamelus*), a species of antelope, with somewhat ox-like head and body, but with long slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and is more than four feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forwards. The female has

Nyl-Ghau (*Antelope picta*).

no horns. The neck is deep and compressed, not rounded as in most of the antelopes. A slight mane runs along the neck and part of the back, and the breast is adorned with a long hanging tuft of hair. The back is almost elevated into a hump between the shoulders. The N. inhabits the dense forests of India and Persia, where it has long been regarded as one of the noblest kinds of game. It is often taken, like other large animals, by the enclosing of

a large space with nets, and by great numbers of people. It is a spirited animal, and dangerous to a rash assailant. It is capable of domestication, but is said to manifest an irritable and capricious temper.

NYMPHÆA'CEÆ, a natural order of exogenous plants, growing in lakes, ponds, ditches, and slow rivers, where their fleshy rootstocks are prostrate in the mud at the bottom; and their large, long-stalked, heart-shaped, or peltate leaves float on the surface of the water. Their flowers also either float, or are raised on their stalks a little above the water. The flowers are large, and often very beautiful and fragrant. There are usually four sepals, and numerous petals and stamens, often passing gradually into one another. The ovary is many-celled, with radiating stigmas, and very numerous ovules, and is more or less surrounded by a large fleshy disc. The seeds have a farinaceous albumen. More than fifty species are known, mostly natives of warm and temperate regions. The rootstocks of some of them are used as food, and the seeds of many.—See **WATER-LILY**, **LOTUS**, **VICTORIA**, and **EURYALE**.—Very nearly allied to *N.* are *Nelumbiaceæ*. See **NELUMBO**.

NYMPHS, in Classic Mythology, female divinities of inferior rank, inhabiting the sea, streams, groves, meadows and pastures, grottoes, fountains, hills, glens, trees, &c. Among the *N.*, different classes were distinguished, particularly the *Oceanides*,

daughters of Oceanus (*N.* of the great ocean which flows around the earth), the *Nereids*, daughters of Nereus (*N.* of the inner depths of the sea, or of the Inner Sea—the Mediterranean), *Potamides* (River *N.*), *Naiads* (*N.* of fountains, lakes, brooks, wells), *Oreades* (Mountain *N.*), *Dryads* or *Hamadryads* (Forest *N.*, who were believed to die with the trees in which they dwelt). They were the goddesses of fertilising moisture, and were represented as taking an interest in the nourishment and growth of infants, and as being addicted to the chase (companions of the divine huntress Diana), to female occupations, and to dancing. They are among the most beautiful conceptions of the plastic and reverent (if credulous) fancy of the ancient Greeks, who, in the various phenomena of nature—the rush of sea-waves, the bubble of brooks, the play of sunbeams, the rustle of leaves, and the silence of caves—felt, with a poetic vividness that our modern science will hardly permit us to realise, the presence of unseen joyous powers.

NYSSA. See **TUPELO TREE**.

NYSTADT, a town of Finland, on the eastern coast of the Gulf of Bothnia, 50 miles south of Biorneborg. Here, in 1721, a treaty was agreed to, between Russia and Sweden, by virtue of which all the conquests of Peter the Great along the coasts of the Gulf of Finland were annexed to Russia. Pop. 2610.



THE fifteenth letter in the English and in most western alphabets, is one of the five simple vowel-signs of the English language. As the language is at present pronounced, it stands for at least four distinct sounds, heard in the words *note*, *nôr*, (*nôt*), *move*, *son*. The primary and simple sound of O is that heard long in *nôr*, and short in *nôt*, *ôp*. The sound given to it in such words as *note*, *go*, is really a diphthong—a long o terminating in a slight u or oo sound (*ôj*). The corresponding

letter in the Hebrew and Phœnician Alphabet (q. v.) was called Ayn, i. e., 'eye'; and accordingly the primitive form of the Phœnician letter was a rough picture of an eye, which naturally became a circle with a dot in the centre—still to be seen in some ancient inscriptions—and then a simple circle.

O, a prefix in many Irish family names, serves to form a patronymic, like *Mac* in Gaelic names; as O'Brien, a descendant of Brien. By some, it is considered to be derived from *of*; but it is more likely from Ir. *ua*, Gael. *ogha*, a grandson. In the Lowland Scottish, the word *oe* is used for grandson, and in some localities for nephew.

OAHU, one of the Sandwich Islands (q. v.).

OAJA'CO, OAXACA, or GUAXACA, a city of Mexico, capital of a state of the same name, stands on the river Rio Verde, 210 miles south-south-east of Mexico. It covers an area 2 miles in length by 1½ in breadth, is well built, with open streets, interspersed with plantations, on which the cochineal insect feeds, and has about 25,000 inhabitants. Silk, cotton, sugar, and chocolate are manufactured.

OAK (*Quercus*), a genus of trees and shrubs of the natural order *Cupulifera*, having a three-celled ovary, and a round (not angular) nut—which is called an *acorn*—placed in a scaly truncated cup, the lower part of it invested by the cup. The species are very numerous, natives of temperate and tropical countries. A few species are found in Europe. North America produces many; and many are natives of mountainous regions in the torrid zone; some are found at low elevations in the valleys of the Himalaya, some even at the level of the sea in the Malay peninsula and Indian islands. But in the peninsula of India and in Ceylon, none are found; and none in tropical Africa, in Australia, or in South America. The oaks have alternate simple leaves; which are entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but more generally deciduous. Many of them are trees of great size, famous for the strength and durability of their timber, as well as for the majesty of their appearance, and their great longevity.—Throughout all parts of Europe, except the extreme north, two species are found, or varieties of one species, the COMMON OAK (*Q. robur*); one (*Q. pedunculata*) having the acorns on longish stalks,

the other (*Q. sessiliflora*) having them almost without stalks. Other differences have been pointed out; but they are regarded by some of the most eminent and careful botanists as merely accidental, and not coincident with these; while, as to the length of the fruit-stalks, every intermediate gradation occurs. Both varieties occur in Britain, the first being the most prevalent, as it is generally in the north of Europe; the second being more abundant in more southern countries. The short-stalked oak is sometimes called DURMAST OAK in England. It has been much disputed which is entitled to be considered the true British oak; and much alarm has occasionally been expressed lest new plantations should be made of the wrong kind; whilst the most contradictory statements have been made as to the comparative value and characters of the timber. The oak succeeds best in loamy soils, and especially in those that are somewhat calcareous. It cannot endure stagnant water. It succeeds well on soils too poor for ash or elm; but depends much on the depth of the soil, its roots penetrating more deeply than those of most other trees. Noble specimens of oak trees, and some of them historically celebrated, exist in almost all parts of Britain; but are much more frequent in England than in Scotland. The former existence of great oak forests is attested by the huge trunks often found in bogs. The oak attains a height of from 50 to 100 or even 150 or 180 feet; the trunk being four, six, or even eight feet in diameter. It sometimes grows tall and stately, but often rather exhibits great thickness of bole and magnitude of branches. It reaches its greatest magnitude in periods varying from 120 to 400 years, but lives to the age of 600, or even 1000. The timber is very solid, durable, peculiarly unsusceptible of the influence of moisture, and therefore eminently adapted for ship-building. It is also employed in carpentry, mill-work, &c.—The bark abounds in tannin; it also contains a peculiar bitter principle called *Quercine*, and is used in medicine, chiefly in gargles, &c., on account of its astringency, sometimes also as a tonic; it is used along with gall-nuts in the manufacture of ink; but most of all for tanning (see BARK), and on this account the oak is often planted as copse-wood (see COPSE) in situations where it cannot be expected to attain to great size as a tree. The timber of copse oak is excellent firewood. The oak is particularly fitted for copse-wood, by the readiness with which it springs again from the stools after it has been cut.—Acorns are very nourishing food for swine, and in times of scarcity have been often used for human food, as, indeed, they commonly are in some very poor countries, either alone or mixed with meal. The bitterness which makes them disagreeable is said to be in part removed by burying them for a time in the earth. The acorns of some trees are also much less bitter than others, and oaks of the common species occur which produce acorns as sweet as chestnuts. Other varieties of the common oak are assiduously propagated by nurserymen as

curious and ornamental, particularly one with pendulous branchlets (the *Weeping Oak*), and one with branches growing up close to the stem, as in some kinds of poplar. Among the Greeks and Romans, the oak was sacred to Zeus or Jupiter; and it has been connected with the religious observances of many nations, as of the ancient Celts and Germans. —The **TURKEY OAK** or **ADRIATIC OAK** (*Q. cerris*), now very frequently planted in Britain, is a large and valuable tree, very common in the south-east of Europe, and in some parts of Asia. The timber is imported in considerable quantity into Britain for ship-building and other purposes. The leaves differ from those of the common oak in their acute lobes, and the cups of the acorns are mossy, i.e., have long, loose, acute scales. Similar to this, in both these respects, are the **AUSTRIAN OAK** (*Q. Austriaca*), abundant near Vienna, and the **SPANISH OAK** (*Q. Hispanica*). —The **CORK OAK** or **CORK-TREE** (*Q. suber*) is noticed in the article **CORK**; the **HOLM OAK** or **EVERGREEN OAK** (*Q. ilex*), another of the species found in the south of Europe, in the article **ILEX**. —Of the North American oaks, some are very valuable as timber trees. Perhaps the most important is the **WHITE OAK** or **QUEBEC OAK** (*Q. alba*), a large tree, the leaves of which have a few rounded lobes. It is found from the Gulf of Mexico to Canada; and in some places forms the chief part of the forest. The timber is less compact than that of the British oak; that of young trees is very elastic. —The **OVERCUP OAK** (*Q. lyrata*), a majestic tree, highly esteemed for its timber, and having its acorns almost covered by their globular cup, grows chiefly in lands liable to inundation in the Southern States. —The **CHESTNUT-LEAVED WHITE OAK** (*Q. prinus*) is also a much-esteemed timber tree of the Southern States. —The **SWAMP WHITE OAK** (*Q. bicolor*), a closely allied species, extends further north. —The **LIVE OAK** (*Q. virens*), an evergreen species, with entire leathery leaves, is regarded as a tree of the first importance in the United States, from the excellence of its timber and its value for ship-building, so that efforts have been made by the government to protect it and to promote the planting of its acorns. Yet it is not a very large tree, being seldom more than forty-five feet in height, with a trunk of two feet in diameter. It grows on the coasts of the Gulf of Mexico, and as far north as Virginia. It once abounded on the Sea Islands, now so celebrated for their cotton. —The **RED OAK** (*Q. rubra*), a large tree, with sinuated and lobed leaves, the lobes toothed and bristle-pointed, yields great part of the *Red Oak Staves* exported from Canada and the north of the United States to the West Indies; but *Red Oak Staves* are also produced in the Middle and Southern States by the **SCARLET OAK** (*Q. coccinea*), a very similar species, by the **BLACK OAK** or **QUERCITRON OAK** (*Q. tinctoria*), another species with the lobes of the leaves bristle-pointed, better known for the dye-stuff which its bark yields (see **QUERCITRON**), and by the **Willow Oak** (*Q. phellos*), a large tree with lanceolate leaves and a willow-like aspect. The timber of all these species is of very inferior quality. These are the American oaks of greatest economical and commercial importance, but there are numerous other species, some of them trees, some mere shrubs, of which some grow on poor soils, and cover them in compact masses; resembling in this a single European species (*Q. viminalis*), a native of the Vosges, 6–8 feet high, with slender tough branches, which makes excellent hedges. —The **BLACK JACK** (*Q. nigra*) is an American oak, chiefly notable for the abundance in which it grows on some of the poorest soils. It is a small tree, and its timber of little value. The bark is black. —Some of the Nepaulese oaks are large and

valuable trees, as are some of those of China and Japan, of Java, of Mexico, &c. The oaks of Java and the other Indian islands have generally the leaves quite entire. —The bark of most of the species of oak is capable of being used for tanning, and is used in different countries. The cups and acorns of the **VALONIA OAK** (*Q. Agilops*) are exported from the Morea and other parts of the Levant, in great quantities, for this purpose, under the name of *Valonia*. See **LEATHER**. The tree resembles the Turkey Oak, and has very large hemispherical mossy cups. The cups are said to contain more tannin than any other vegetable substance. —Galls (q.v.) or Gall-nuts are in great part obtained from the oak therefore called the **GALL-OAK** (*Q. infectoria*), a scrubby bush, a native of Asia Minor, with bluntly serrated, ovate-oblong leaves. —The **KERMES OAK** (*Q. coccifera*), on the leaves of which the Kermes (q.v.) insect is found, is a low bush, with evergreen spinous leaves, much resembling a holly, a native of the south-east of Europe. —Of oaks with sweet and edible acorns, may be mentioned the **BALLOTE OAK** (*Q. Ballota* or *Gramuntia*), an evergreen with round spiny-toothed leaves, a native of the north of Africa, the acorns of which are regularly brought to market in Algeria and in Spain, and are long and cylindrical; the **Italian Oak** (*Q. Esculus*), closely allied to the common oak; and the **DWARF CHESTNUT OAK** (*Q. chinquapin* or *prinoidea*) of North America, a small shrubby species, which has been specially recommended to cultivation on this account. Other North American species, and some of the Himalayan species, also produce edible acorns. From the acorns of some species, oil is made in considerable quantity in different parts of the world, and is used in cookery. —The leaves of the **Manna Oak** (*Q. mannifera*) — a native of the mountains of Kurdistan, having oblong, blunt-lobed leaves — secrete in hot weather a kind of manna, a sweet mucilaginous substance, which is made into sweetmeats, and very highly esteemed.

The name Oak is sometimes popularly applied to timber trees of very different genera. Thus, **AFRICAN OAK** is another name of African Teak. See **TEAK**. Some of the species of *Casuarina* (q.v.) are called Oak in Australia. The **STONE OAK** (*Lithocarpus Javanensis*) of Java, so named from the extreme hardness of its timber, is a tree of the same family with the true oaks.

OAK BEAUTY (*Biston prodromaria*), a moth of the family *Geometridae*, a native of England, about an inch and a half or two inches in expanse of wings; the upper wings with two brown curved bands, and margined with black, the lower wings with one brown band. The caterpillar feeds on the oak.

OAKHAM, the county-town of Rutlandshire, England, in the vale of Catmos, 25 miles west-north-west of Peterborough. It is a station on the Syston and Peterborough branch of the Midland Railway. In former times, there was a castle here; it is now in ruins, with the exception of the portion used as the county-hall. The church, the interior of which was beautifully restored in 1853, is an edifice in the perpendicular style, and has a fine tower and spire. The Free Grammar-school, with an annual endowment of about £700 a year, was founded in 1581. Pop. 2948.

OAKUM a tangled mass of tarred hempen fibres, is made from old rope by untwisting the strands and rubbing the fibres free from each other. Its principal use is in Caulking (q.v.) the seams between planks, the space round rivets, bolts, &c., for the purpose of preventing water from penetrating.

to have taken refuge in them. In the 5th c., Nestorius, the Bishop of Constantinople, was banished there. He was rescued by an excursion of the Blémyes, but expired soon after his arrival at the Nile. The oases were then a place of desolation and horror, occasionally plundered by Beduins. They fell, 943 A.D., into the power of the Arabs, after having been held by the Egyptian monarchs and their successors till that period; and they are described by Edrisi (1150 A.D.) as uninhabited; by Abulfeda (1240 A.D.) and by Leo Africanus (1513 A.D.), as inhabited and cultivated, and quite independent, having three fortresses. The first modern traveller who visited them is supposed to have been Poncet (1698 A.D.). Subsequently, in 1792, Browne discovered the oasis of Ammon at El Siwah; and it was visited in 1798 by Hornemann, and in 1819 by Caillaud. It lies in 29° 12' 20" N. lat., and 26° 6' 9" E. long. Drovetti and Minutoli also visited the same spot.

These oases are now held by Muggrebi Arabs, a powerful race in the Desert, capable of raising 30,000 men, who supply camels and guides to travellers. The oases are four in number: 1. El Khargeh, or the Oasis Magna, the Greater Oasis of Ptolemy; 2. El Kasr, or Oasis Parva, the Lesser Oasis; 3. Siwah, or the Oasis of Ammon, the most northerly; 4. The Western Oasis, or Dakkel, mentioned by Olympiodorus, and visited by Sir Archibald Edmonstone in 1819. Of El Khargeh, full particulars have been given by M. Hoskins, who discovered it lying about 125 miles west of the Nile, having a stream of water rising near the village of Genah, on the north-west of the oasis, and lost in the sand. It is bounded on the east by Hagel-bel-Badah. North of El Gem lies the metropolis, El Khargeh, which consists of a series of covered streets and open bazaars. The temple lies two hours' journey from it, in a fine situation; the *sekos* has a vestibule of 500 feet, with pylons, or gateways, the first of which has a decree in Greek, dated in the reign of Galba (68 A.D.), against forcing persons to farm the revenue, preventing imprisonment for debt, preserving the dowries of women, and limiting the office of strategos for three years. The temple has other decrees preventing the officers of government from smuggling. It has an avenue of sphinxes and three pylons; on the third, Darius is represented offering to Amen Ra, Osiris, and Isis; while Nekht-her-hebi (Nectabes) continued the ornaments of the temple about 414—340 B.C. The *sekos* is 140 feet long, and represents Darius offering to Amen Ra, or Khnumis, the ram-headed god, and Osiris; while in the accompanying scenes are seen Anta, or Anaitis, Raspu, or Reseph. In the vicinity is a magnificent necropolis of 150 sepulchres, of a late period, with Doric and Corinthian capitals. There are several temples at other spots of the oases. 2. El Kasr, the Oasis Parva, lies four or five days' journey south-east of Siwah, called the Wah-el-Bahnasa, or Wah-el-Menesheh, contains no monuments older than the Roman, consisting of a triumphal arch, subterraneous and other aqueducts, several hot springs, a necropolis, and Christian church. This oasis was first conquered by the Arabs; and in its vicinity is another oasis called Wady Zerzoora, with others adjoining, of inferior interest. 3. Siwah, or the Oasis of Ammon—one of the first discovered, and repeatedly visited, has, unfortunately, not been seen by any one acquainted with hieroglyphics—lies west of the Natron Lakes. It would appear from Minutoli that the temple was built by Nekht-her-hebi, or Nectabes I., in honour of the god Khnum, Ammon Khnumis or Chnebis, who, as the deity of water, presided over the water from which the oasis

originated. The oasis is nine miles broad and two long, contains El Garah Gharmy, and Mencheyeh, has a population of about 8000 inhabitants, possesses date and other trees, grows cereals, and has sulphurous springs, a salt lake at Arachieh, and many ruined temples, a necropolis, and other remains. The oracle of Ammon is supposed to have been at a place called Om-Beydah, or the temple of Nekht-her-hebi. From this, it would seem that the oasis did not fall into the power of Egypt till about the 5th c. B.C. The celebrated Fountain of the Sun is at Siwah Shargieh. It is 30 paces long, 20 broad, six fathoms deep, with bubbles constantly rising to the surface, steaming in the morning, and warmer at night. Close to it are the remains of the sanctuary of Ammon. 4. El Dakkel, or the Western Oasis, lies about 78 miles south-west of Siout. The principal ruin at Dar-el-Hadjar consists of a small temple, dedicated to Khnumis by the Roman emperors, Nero and Titus. At Ain Amoor, between this oasis and the Oasis Magna, is a temple built under the Roman empire.—Herodotus, iii. 26; Strabo, ii. p. 130, xvii. pp. 790, 791, 813; Ptolemy, iv. 5, 37; Minutoli, *Reise zum Tempel des Jupiter Ammon* (Berlin, 1824); Hoskins, *Visit to the Great Oasis* (8vo, Lond. 1837); Champollion, *L'Egypte*, p. 282.

OAT, or OATS (*Avena*), a genus of grasses, containing many species, among which are some valuable for the grain which they produce, and some useful for hay. The Linnaean genus *Avena*, less natural than most of the Linnaean genera, has been much broken up. The genus, as now restricted, has the spikelets in loose panicles, the glumes as long as the florets, and containing two or more florets; the palea firm, and almost cartilaginous, the outer palea of each floret, or of one or more of the florets, bearing on the back a knee-jointed awn, which is twisted at the base. The awn, however, tends to disappear, and often wholly disappears in cultivation. Those species which are cultivated as corn-plants have comparatively large spikelets and seeds, the spikelets—at least after flowering—pendulous. The native country of the cultivated oats is unknown, although most probably it is Central Asia. There is no reference, however, to the oat in the Old Testament; and although it was known to the Greeks, who called it *Bromon*, and to the Romans, it is probable that they derived their knowledge of it from the Celts, Germans, and other northern nations. It is a grain better suited to moist than to dry, and to cold than to warm climates, although it does not extend so far north as the coarse kinds of barley. The grain is either used in the form of Groats (q. v.) or made into meal. Oatmeal cakes and porridge form great part of the food of the peasantry of Scotland and of some other countries. No grain is so much esteemed for feeding horses. Besides a large quantity of starch—about 65 per cent.—and some sugar, gum, and oil, the grain of oats contains almost 20 per cent. of nitrogenous principles, or Proteine (q. v.) compounds, of which about 16 or 17 parts are *Avenine*, a substance very similar to *Casine* (q. v.), and two or three parts gluten, the remainder albumen. The husk of oats is also nutritious, and is mixed with other food for horses, oxen, and sheep. From the starchy particles adhering to the husk or seeds after the separation of the grain, a light dish, called *sowans*, is made in Scotland by means of boiling water, was once very popular, and is very suitable for weak stomachs. The grain is sometimes mixed with barley for distillation. The Russian beverage called *quass* is made from oats. The straw of oats is very useful as fodder, bringing a higher price than any other kind of straw. —The varieties of oats in cultivation are very

the Jesuits' College at Valladolid; but was expelled for misconduct, after a trial of a few months. He was again received by the Jesuits, on his earnest protestations of repentance, at St Omer, where he was no less unsuccessful, and was finally dismissed by them in the early part of 1678. He now, as a mere vagabond adventurer, set himself to live by his wits, in the evil exercise of which he devised, about this time, the atrocious scheme with which his name is identified in history. Just then, great excitement and alarm pervaded the Protestant party in England. It was well known that Charles was at heart a Roman Catholic; and his brother, the Duke of York, afterwards James II., was an active and avowed zealot on the same side. The growing confidence of the Roman Catholics was unconcealed; and with or without instant reason, the cry so often since heard arose, and was everywhere re-echoed, that the 'Protestant religion was in danger.' In this fevered state of general feeling, O. saw his opportunity, and dexterously and boldly availed himself of it. He communicated to the authorities the details of a pretended plot, the figment of his own brain, the main elements of which were a rising of the Catholic party, a general massacre of Protestants, the burning of the city of London, the assassination of the king, and the invasion of Ireland by a French army. In certain of its items, the fiction was devised with considerable ingenuity to catch the popular belief. By the strangest coincidence, moreover, there just then occurred in aid of it a series of events which seemed conclusively to attest its genuineness. A correspondence, the object of which was the propagation of the Roman Catholic religion, came to light between the secretary of the Duke of York and Pere La Chaise, the confessor and confidant of Louis XIV. Danny, the prime minister, it also appeared, had been busy with intrigues in the same quarter. Finally, Godfrey, the zealous magistrate through whom publicity was first given to 'the plot,' was found mysteriously murdered. After this, could reasonable doubt exist? Was not the English St Bartholomew already begun? All London went wild with fear and rage; and it seemed at one time likely that a massacre of Roman Catholics would be substituted for the dreaded extermination of the Protestants. The probability which might have done something to allay the excitement, was itself swept heaving away by it. The king alone, whose life was threatened, but who, dissolute and indolent as he was, wanted neither courage nor shrewdness, stuck to his honour, scornfully insisted that the plot was merely some insane delusion, and tried, so far as he could, to control the excesses which followed. Too probably, his interference was of the characteristically enay, *mauvais* kind; in any case, it did not avail. The story of O. was universally believed; and he became the popular hero of the day. A pension of £900 a year was granted him; a suite of apartments in the palace at Whitehall was set apart as sacred to his use; and wherever he went, the Protestant public wildly cheered him as their saviour. With the aid of a set of suborned ruffians, only one degree less foul than himself, convictions of his victims were readily obtained,

judges and juries vying with each other in their unquestioning reception in evidence of the grossest and most manifest perjuries; and many innocent Roman Catholic gentlemen died the death of traitors at the block. Over the space of two years, the base success of O. was signalled by a series of judicial murders. Naturally, however, as reason resumed its sway, doubts began to be felt; and on the execution of a venerable and respected nobleman, Viscount Stafford, with a strong shock of pity and remorse, public suspicion awoke, and a violent reaction set in. It was only, however, on the accession of James II. in 1685 that retribution overtook the malefactor. Active steps against him were then taken. He was tried before the Court of King's Bench, convicted of perjury, and sentenced to be pilloried, whipped at the cart's tail, and afterwards

Oates in the Pillory.—From a Contemporary Print.

imprisoned for life. We might wonder a little at the leniency of the sentence, were it not thus to be explained: it was intended that the severity of the first two items of punishment should render the last one superfluous, and that the wretch should die under the lash of the executioner. But the hide of O. was beyond calculation tough; and horribly lacerated, yet living, his carcass was conveyed to the prison, from which it was meant never more to issue. Very strangely, however, the next turn of the political wheel brought back the monster to the light of day and to prosperity. When the revolution of 1688 placed William on the throne, the Protestant influence triumphed once

the truth, the whole truth, and nothing but the truth, so help you God.' Hence, the person who is a witness must have sufficient understanding to know the nature and obligations of an oath; and on this ground, young children are incompetent to be witnesses. Another condition or qualification required in the party who takes an oath as a witness is, that he has a competent sense of religion, in other words, he must not only have some religious knowledge, but some religious belief. He must, in substance, believe in the existence of a God, and in the moral government of the world; and though he cannot be questioned minutely as to his particular religious opinions, yet, if it appear that he does not believe in a God and future state, he will not be allowed to give his evidence, for it is assumed, that without the religious sanction, his testimony cannot be relied upon. So long, however, as a witness appears to possess competent religious belief, the mere form of the oath is not material. The usual practice in England and Ireland is, for the witness, after hearing the oath repeated by the officer of court, to kiss the four gospels by way of assent; and in Scotland, the witness repeats similar words after the judge, standing and holding up his right hand, 'swearing by Almighty God, as he shall answer to God at the Great Day of Judgment,' but without kissing any book. Jews are sworn on the Pentateuch, keeping on their hats, and the oath ends with the words, 'so help you Jehovah.' A Mohammedan is sworn on the Koran; a Chinese witness has been sworn by kneeling and breaking a china saucer against the witness-box. Thus, the mere form of taking the oath is immaterial; the witness is allowed to take the oath in whatever form he considers most binding upon his own conscience—the essential thing being, however, that the witness acknowledge some binding effect derived from his belief in a God or a future state.

The policy of insisting upon the religious formalities attending the taking of an oath, has been much discussed of late years, and it has been disputed whether atheists, who avow an entire absence of all religious belief, should be entirely rejected as witnesses (as is sometimes the case), and justice be thereby frustrated. The objections of Quakers, Moravians, and Separatists to taking an oath have long been respected as not being fundamentally at variance with a due sense of religious feeling, and hence they have by statute been allowed to make an affirmation instead of taking the oath. In 1854, another concession was made to those who, not being Quakers, yet refuse to take the oath from sincere conscientious motives, and these are now also allowed to affirm instead of swear. But the law remains as before, that atheists and persons who admit that they have no religious belief whatever, are excluded from giving evidence in courts of justice.

When a witness, after being duly sworn, gives false evidence in a court of justice or in a judicial proceeding, and his evidence so falsely given is material, he commits the offence of *perjury*; but it is necessary, in England, not only that two witnesses shall be able to prove the falsity of such evidence, but also that the party should be proceeded against, in the first instance, before a justice of the peace, or by order of a judge, or the attorney-general, it being found that frivolous and unfounded indictments were often preferred against witnesses by disappointed or hostile parties. As a general rule, perjury cannot be committed except in some judicial proceeding, or rather the giving of false evidence cannot be punished except it has been given in some judicial proceeding. The practice formerly existed of persons

voluntarily taking oaths in various matters not connected with any judicial proceeding; and creditors often in this manner sought to add to other securities by insisting on a formal oath before a justice of the peace, in some isolated matter of fact. This practice was put an end to by the statute 5 and 6 Will. IV. c. 62, by which justices of the peace were prohibited from administering or receiving such oaths touching any matter or thing whereof such justice has not jurisdiction or cognizance by some statute. It is left to some extent to the discretion of the justice whether the particular matter is one as to which it is proper to administer an oath; but when it is considered proper, the declaration may be made in the form given by that statute; and if the party make a false declaration, he commits a misdemeanour. Unlawful oaths generally mean oaths taken by members of secret and illegal societies of a treasonable description; and statutes long ago passed to inflict penalties on all who took or administered such oaths.

OATH OF CALUMNY, in Scotch Law, means an oath taken by a party at the instance of his opponent, that the allegations were well founded. Oaths of verity and credulity are oaths that a debt or claim is well founded.

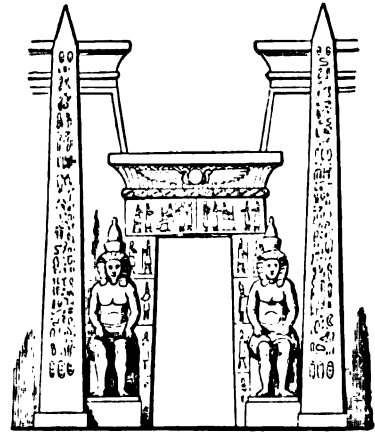
OATHS, MILITARY. The taking of the oath of fidelity to government and obedience to superior officers, was, among ancient armies, a very solemn affair. A whole corps took the oath together, sometimes an entire army. In modern times, when so many other checks are used for maintaining discipline, the oath has become little more than a form. In the United Kingdom, a recruit enlisting into the army or militia, or a volunteer enrolling himself, swears to be faithful to the sovereign, and obedient to all or any of his superior officers; also to divulge any facts coming to his knowledge which might affect the safety of his sovereign, or the stability of that sovereign's government. The members of a court-martial take an oath to try the cases brought before them justly, according to the evidence, to keep secret the finding until confirmed by the crown, and to keep secret always the opinions given by the members individually. The only other military oath is the common oath of a witness before a court-martial to tell the truth, the whole truth, and nothing but the truth.

OB, or OBI, the great river of Western Siberia, rises in two branches, the Bia and the Katune or Katunga, both of which have their origin in the Altai Mountains, within the frontier of the Chinese dominions, about lat. 49° N., and long. 90° E. These branches, flowing in a north-west direction, unite to form the Ob at the town of Biak in lat. 52° 30' N., long. 85° E. Pursuing a winding course, with a general north-west direction, the Ob reaches the meridian of 75° E., when it turns west, and maintains that direction to its confluence with the Irtysh, the greatest of its tributaries. It then flows north-west, north, and north-east, to its mouth in the Gulf of Ob, which it reaches after a course of 2000 miles. Its chief affluents on the right are the Tom—a swifter stream than the Ob, 400 miles in length, and navigable for the last 280 miles from the beginning of May till July—the Tchulim, and the Ket. The principal affluent on the left is the Irtysh, which, rising within the frontier of the Chinese territories, traverses the Altai Mountains, and after a course longer than that of the Ob itself, joins that river 250 miles below Tobolsk. The trade of the Irtysh, of which the centre is Tobolsk, is important. The principal towns on the banks of the Ob are Narim, Sargut, Berezw, and Otdorsk.—The Gulf of Ob is a long inlet of the Arctic Ocean,

rafts to the spot where they were intended to be placed, and raised from their horizontal position by inclined planes, aided by machinery. Some obelisks, before their erection, had their pyramid capped with bronze gilded, or gold, the marks of such covering still being evident on their surfaces. Under the Roman empire, they were raised by pulleys and heavy tackle. The difficulty of erecting the fallen ones in the ages of the renaissance, as also the mechanical appliances for the lowering from its original site the obelisk of Luxor in 1831, and erecting it in the Place de la Concorde in 1833 by Le Bas, shew the difficulties experienced by the ancients. The use of obelisks is as old as the appearance of art itself in Egypt; these grand, simple, and geometric forms being used in the 4th dynasty, and continued till the time of the Romans. Their object is enveloped in great obscurity. At the time of the 18th dynasty, it appears that religious ceremonies and oblations were offered to the obelisks, which were treated as divinities. Their sepulchral use is evinced by their discovery in the tombs of the 4th dynasty, and the vignettes of early papyri. No large obelisk is older than that of Matarieh or Heliopolis, erected by Osortesen I. about 1900 B.C.; and that of Beggig or Crocodilopolis is, in reality, only a stele. Thothmes I. placed two of large size before the granite sanctuary of Karnak, and his daughter Hatasu, two others of above 90 feet high, before the second propylæon. Additional sculptures were made on these obelisks by Sethos I., who restored them. Thothmes III. appears to have erected many obelisks. The oldest is that of the Atmeilan or Hippodrome of Constantinople, erected to record his conquest of Naharania or Mesopotamia. Two others, which formerly stood at Heliopolis, were subsequently re-erected by Rameses II. at Alexandria. One of these still remains erect, and is popularly known as Cleopatra's Needle, the other lies prostrate. Both have greatly suffered from the effects of sea breezes. The highest of all obelisks, that of St John of the Lateran, appears to have been removed from Thebes, and set up by Thothmes IV. 35 years after the death of Thothmes III. A small obelisk of Amenophis II., said to have been found in the Thebaid, apparently from Elephantine, is in the collection of the Duke of Northumberland at Sion. Sethos I. commenced the Flaminian obelisk, subsequently completed by Rameses II., and placed at the temple of Heliopolis. It was removed to Rome by Constantius, and found 16 feet under the surface in the pontificate of Gregory XIII., and erected in that of Sextus V. by the architect Fontana. The other obelisks of Rameses II. are, the one at the Luxor quarter of Thebes, the companion of which was removed to the Place de la Concorde at Paris in 1833; the two obelisks of San or Tanis; that of the Boboli Gardens of Florence, transported from the circus of Flora at Rome; the obelisk of the Rotonda at Rome, erected by Clement XII., 1711 A.D.; and that of the Villa Mattei, which decorated the Ara Cœli of the Capitol. A fragment of another obelisk was in the Collegio Romano. No obelisks are known of other monarchs till the 26th dynasty. That of the Monte Citorio at Rome, erected by Psammeticus II. at Heliopolis, was transported by Augustus to the Campus Martius, having been exhumed 1748 A.D., and erected by the architect Antinori in that of Pius VI. Two other obelisks of small size, made of black basalt, dedicated by Nekhttherhebi or Nectanebes II. at Hermopolis, commonly known as the obelisks of Cairo, are in the British Museum. Ptolemy Philadelphus is said to have erected in the Arsinoeum at Alexandria a plain obelisk of 80 cubits, cut in the quarries by Nectabis. It was set

up by the architect Satyrus. Two obelisks, erected by Ptolemy Euergetes II. and his wife Cleopatra, stood before the temple of Philæ, one of which was removed to Corfe Castle by Mr Bankes. The so-called Pamphiliano obelisk at Rome, erected by E. Bernin in 1651, in the Piazza Navona, under the pontificate of Innocent X., was removed from the Circus of Maxentius, having, as their hieroglyphical legends testify, been originally erected by Domitian before the Serapeum at Rome. The last of the Roman obelisks was the Barberini, which was found in 1633 on the site of the Circus of Aurelian, and finally erected in 1822 on the Monte Pincio. It was placed by the Emperor Hadrian before the mausoleum or cenotaph either of himself or Antinous, between 132—138 A.D. Barbarous hieroglyphs, found on the Sallustian obelisk, are copied from the Flaminian obelisk. It is supposed to have been transported to Rome, unadorned with hieroglyphs, by Sallustius Crispus, prefect of Numidia, and to have been set up in the gardens of Sallust, in the reign of Vespasian. It was erected by Antinori, 1789, before the Church of Trinita del Monte. It has been seen how, on the renaissance of the arts, the obelisks were restored and applied to the embellishments of modern Rome, either as columns in the centres of piazzas or squares, or else as the ornaments of fountains; one obelisk being set up alone in the centre of the piazzas and places of Italy and France, while in antiquity they always stood in pairs before the Pylons.

Two small obelisks, and the apex of a third, have been found in Assyria, in shape of truncated prisms, the apices step-shaped. The most interesting is that of the north-west palace of Nimrud, of black marble, is 5 feet 9 inches high. Each side has five compartments of bas-reliefs, representing the tribute and offerings made to the Shalmanaser. It is covered with a cuneiform inscription, recording the annals of the king's reign, from his 1st to his 31st year. On it is represented



Obelisks in front of a Temple.

the tribute of Jahu, king of Israel. A second obelisk, of white marble, measures 8 feet 2 inches high, is covered with bas-reliefs, representing scenes of war and tributes, winding round it like those of a Roman triumphal column. On it is an inscription of Shamas-Pul. The broken apex of a third has a dedication from Ashur-izir-pul II. An obelisk of Semiramis at Babylon is mentioned by Diodorus, and another of Aricarus was interpreted by Democritus. Under the Roman empire, obelisks were

used as gnomons, placed in the public spaces, or erected in the *spina* of the *circi*. The first removal of obelisks to Rome took place in the reign of Augustus, who placed one in the circus, said to have been originally erected in the reign of Semipertus, 85½ feet high; and another of 9 feet less, in the Campus Martius, and had it adjusted as a gnomon by the mathematician Pacundus Novus; a third obelisk was erected in the Circus of Caligula and Nero in the Vatican, and originally dedicated to the sun by Nuncoreus, the son of Sesosis, on the recovery of his sight. Two other small obelisks, which decorated the mausoleum of Augustus, and were erected by Claudius or Vespasian and his sons, have been found. Other obelisks are known to have been removed by Constantius, 354 A. D. P. Victor, in his description of the quarters of ancient Rome, reckons 6 of the largest size and 42 others. The Romans added to them brazen spheres and other decorations. Some were removed to Constantinople by Theodosius the younger, and Valentinian, 390 A. D. The translation of the inscription of one of the Roman obelisks made by a Greek or Egyptian, named Hermapiion, has been preserved by Ammianus Marcellinus.—Kircher, *Œdipus Ægyptiacus* (tom. iii. Rom. 1652—1654); Zoega, *De Origine et Usu Obeliscorum* (fo. Rom. 1797); Cipriani, *Sui Dodici Obelisci di Roma* (fo. Rom. 1823); L'Hôte, *Notice Historique sur les Obélisques Égyptiens* (8vo, Paris, 1836); Birch, *Notes upon Obelisks, in the Museum of Classical Antiquities* (8vo, Lond. 1853), pp. 203—239; Layard, *Nineveh and its Remains*, vol. i. p. 346; Sir H. Rawlinson, *A Commentary on the Cuneiform Inscriptions* (12mo, Lond. 1850).

OBERLIN, JOHANN FRIEDRICH, distinguished for his active benevolence and usefulness, was born at Strasburg, 31st August 1740; and in 1766 became Protestant pastor of Waldbach, in the Ban de la Roche or Steinthal, a wild mountainous district of Alsace. Here he spent the remainder of his life, combining an affectionate diligence in the ordinary duties of the pastorate, with wise and earnest endeavours to promote the education and general prosperity of the people. The district had suffered terribly in the Thirty Years' War, and the scanty population which remained was sunk in poverty and ignorance. O. introduced better methods of cultivating the soil, and various branches of manufacture. The population, which was scarcely 500 when he entered on his labours, had increased to 5000 at the close of the century. Yet, though animated in all his actions by the most pure and disinterested piety, it may be questioned if he did not carry his moral supervision too far when he kept a register of the moral character of his parishioners, and searched with the minuteness though not the motives of an inquisitor, into the most insignificant details of their private life. O. was ably assisted in his reformatory labours by his pious housekeeper, Luise Schepler, who survived her master eleven years. He died 1st June 1828. Notwithstanding the humble sphere in which his days were spent, his fame as a philanthropist has extended over the world, and his example has stimulated and guided many. See *Brief Memorials of Oberlin*, by the Rev. T. Sims, M.A. (Lond. 1830), and also *Memoirs of Oberlin, with a short notice of Louisa Schepler* (Lond. 1838 and 1852).

OBERON, the king of the Elves or Fairies, and the husband of Titania. The name is derived by a change of spelling from *Auberon*, more anciently *Alberon*, and that from the German *Alberich*, i. e., king of the Elves. O. is first mentioned as 'Roi du royaume de la fêrie' in the old French poem of *Huon de Bordeaux, pair de France*, which was

afterwards made the basis of a popular prose romance. From the French, O. was borrowed by the English poets, Chancer, Spenser, and others, but he is most familiarly known from his appearance in Shakespeare's *Midsummer Night's Dream*. From old French sources, also, Wieland derived part of the materials of his poem of *Oberon*.

OBE'SITY, or CORPULENCE, may be defined to be 'an accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions.' A certain degree of fatness is not only quite compatible with health, but, as has been shewn in the article FATS, ANIMAL, the fatty tissue is of considerable use in the animal body, partly in consequence of its physical, and partly in consequence of its chemical properties; and it is only when the fatness begins to interfere with the discharge of any of the vital powers, that it can be regarded as a morbid condition. Obesity may occur at any period of life, but it is most commonly after the fortieth year that the tendency to an inordinate accumulation of fat begins to shew itself. After that time, in the case of men, the pleasures of the table are usually more attractive than in earlier life, and much less muscular exercise is taken; while in women, the cessation of the power of child-bearing induces changes which tend remarkably to the deposition of fat. The extent to which fat may accumulate in the human body is enormous. Daniel Lambert, who died at the age of forty years, weighed 739 lbs.; his exact height is not recorded, but, according to the investigations of the late Dr Hutchinson (the inventor of the spirometer), the normal weight of a man six feet high should not exceed 178 lbs. Dr Elliotson has recorded the case of a female child, a year old, who weighed 60 lbs.; and those who are interested in the subject will find a large collection of cases of obesity in Wadd's *Cursory Remarks on Corpulence*.

The predisposing causes of obesity are a peculiar habit of body, hereditarily transmitted; inactivity; sedentary occupations, &c.; while the more immediate or exciting causes are a rich diet, including fatty matters, and matters convertible in the body into fats, such as saccharine and starchy foods, and the partaking of such a diet to a greater extent than is necessary for balancing the daily waste of the tissues. 'Fat meats, butter, oily vegetable substances, milk, saccharine and farinaceous substances are the most fattening articles of food; whilst malt liquors, particularly rich and sweet ale are, of all beverages, the most conducive in promoting obesity. The fattening effect of figs and grapes, and of the sugar-cane, upon the natives of the countries where these are abundant, is well known. In various countries in Africa and the East, where obesity is much admired in females, warm baths, indolence, and living upon saccharine and farinaceous articles, upon dates, the nuts from which palm-oil is obtained, and upon various oily seeds, are the means usually employed to produce this effect.'—Copland's *Dictionary of Medicine*, article 'Obesity.' The knowledge of the means of inducing obesity affords us the best clue to the rational treatment of this affection. It is a popular belief that the administration of acids—vinegar, for example, or one of the mineral acids—will check the deposition of fat; but if the desired effect is produced, it is only at the cost of serious injury to the digestive, and often to the urinary organs. The employment of soap and alkalies, as advocated a century ago by Dr Flemming (*A Discourse on the Nature, Causes, and Cure of Corpulency*, 1760), is less objectionable than that of acids, but the prolonged use even of these is usually prejudicial. The

efficacy of one of our commonest sea-weeds, seawrack (*Fucus vesiculosus*), in this affection has lately been strongly advocated. It is prescribed in the form of an extract, and its value is probably dependent on the iodine contained in it.

A very interesting *Letter on Corpulence*, recently (1863) published by Mr Banting, in which he records the effect of diet in his own case after all medicinal treatment had failed, is well worthy of the attention of those who are suffering from the affection of which this article treats. The following are the leading points in his case. He is 66 years of age, about 5 feet 5 inches in stature (and therefore, according to Dr Hutchinson's calculations, ought to weigh about 142 lbs.), and in August 1862 weighed 202 lbs. 'Few men,' he observes, 'have led a more active life . . . so that my corpulence and subsequent obesity were not through neglect of necessary bodily activity, nor from excessive eating, drinking, or self-indulgence of any kind, except that I partook of the simple aliments of bread, milk, butter, beer, sugar, and potatoes, more freely than my aged nature required. . . . I could not stoop to tie my shoe, nor attend to the little offices humanity requires without considerable pain and difficulty; I have been compelled to go down stairs slowly backwards, to save the jar of increased weight upon the ankle and knee joints, and been obliged to puff and blow with every slight exertion' (pp. 10 and 14).

By the advice of a medical friend, he adopted the following plan of diet: 'For breakfast I take four or five ounces of beef, mutton, kidneys, broiled fish, bacon, or cold meat of any kind except pork; a large cup of tea (without milk or sugar), a little biscuit, or one ounce of dry toast. For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira: champagne, port, and beer forbidden. For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret' (p. 18). I breakfast between eight and nine o'clock, dine between one and two; take my slight tea meal between five and six; and sup at nine' (p. 40). Under this treatment he lost in little more than a year (between the 26th of August 1862 and the 12th of September 1863) 46 lbs. of his bodily weight, while his girth round the waist was reduced 12½ inches. He reports himself as restored to health, as able to walk up and down stairs like other men; to stoop with ease and freedom; and safely to leave off knee-bandages, which he had necessarily worn for twenty years past. He has made his own case widely known by the circulation of his pamphlet (which has now reached a third edition); and 'numerous reports sent with thanks by strangers as well as friends,' shew that (to use his own words) 'the system is a great success;' and that it is so we do not doubt, for it is based on sound physiological principles.

OBIT (Lat. *obitus*, a 'going down,' 'death'), literally means the decease of an individual. But as a certain ecclesiastical service was fixed to be celebrated on the day of death (*in die obitus*), the name came to be applied to the service itself. Obit therefore signifies, in old church language, the service performed for the departed. It consisted, in the Roman Church, of those portions of the *Officium Defunctorum* which are called Matins and Lauds, followed by a Mass of the Dead, chanted, or occasionally read. Similar services are held on the day of the funeral, and on the 30th day, and the anni-

versary; and although the name obit was primitively applied only to the first, it has come to be used of them all indiscriminately.

OBJECT, in the language of Metaphysics, is that of which any thinking being or *Subject* can become cognizant. This subject itself, however, is capable of transmutation into an Object, for one may think about his thinking faculty. To constitute a metaphysical object, actual existence is not necessary; it is enough that it is conceived by the subject. Nevertheless, it is customary to employ the term objective as synonymous with real, so that a thing is said to be 'objectively' considered when regarded in itself, and according to its nature and properties, and to be 'subjectively' considered, when it is presented in its relation to us, or as it shapes itself in our apprehension. Scepticism denies the possibility of objective knowledge; i. e., it denies that we can ever become certain that our cognition of an object corresponds with the actual nature of that object. The verbal antithesis of objective and subjective representation is also largely employed in the fine arts, but even here, though the terms may be convenient, the difference expressed by them is only one of degree, and not of kind. When a poem or a novel, for example, obtrudes the peculiar genius of the author at the expense of a clear and distinct representation of the incident and character appropriate to itself, we say it is a subjective work; when, on the contrary, the personality of the author retires into the background, or disappears altogether, we call it objective. The poems of Shelley and Byron; the novels of Jean Paul Richter, Bulwer Lytton, and Victor Hugo; and the paintings of the Pre-Raphaelites belong essentially to the former class; the dramas of Shakspeare, the novels of Scott, and the poems of Goethe, to the latter.

OBJECT-GLASS, the glass in a Telescope (q. v.) or Microscope (q. v.), which is placed at the end of the tube nearest the object, and first receives the rays of light reflected from it.

OBLATES (Lat. *oblatus*, *oblata*, 'offered up'), the name of a class of religious bodies in the Roman Catholic Church, which differ from the religious orders strictly so called, in not being bound by the solemn vows of the religious profession. The institute of oblates was one of the many reforms introduced in the diocese of Milan by St Charles Borromeo, towards the close of the 16th century. The members consisted of secular priests who lived in community, and were merely bound by a promise to the bishop to devote themselves to any service which he should consider desirable for the interest of religion. St Charles made use of their services chiefly in the wild and inaccessible Alpine districts of his diocese. This institute still exists, and has been recently introduced into England. Still more modern are the 'Oblates of the blessed Virgin Mary,' a body of French origin, which arose in the present century, and has been very widely extended; and whose chief object is to assist the parochial clergy, by holding missions for the religious instruction of the people in any district to which they may be invited. This body also has been established in England and in Ireland. Other similar institutes might be enumerated, but the constitution of all is nearly the same. There is also a female institute of oblates, which was established in Rome, about 1440, by St Francisca of Rome, and which consists of ladies associated for charitable and religious objects, and living in community, but bound only by promise, and not by vow.

OBLIGATION is a term used in Scotch Law to denote the binding effect of any legal contract, and

OBSERVATION AND EXPERIMENT—OBSERVATORY.

times. Several communities are still found in the two first-named kingdoms.

OBSERVATION AND EXPERIMENT are the leading features of modern science, as contrasted with the philosophy of the ancients. They are indispensable as the bases of all human knowledge, and no true philosophy has ever made progress without them, either consciously or unconsciously exercised. Thus, by Socrates, Plato, and Aristotle, no less than by Archimedes and the ancient astronomers, observation and experiment are extensively though not prominently or always obviously employed; and it was by losing this clue to the spirit of their masters' teaching, that the later disciples in these schools of philosophy missed the path of real progress in the advancement of knowledge. It was in the latter half of the 16th c. that the minds of philosophers were first *consciously* awakened to the importance of observation and experiment, as opposed to authority and abstract reasoning. This result was first occasioned by the discoveries and controversies of Galileo in Florence; and to the same end were contributed the simultaneous efforts of a number of philosophers whose minds were turned in the same direction—Tycho Brahe in Holland, Kepler in Germany, William Gilbert in England, who were shortly afterwards followed by a crowd of kindred spirits. The powerful mind of Francis Bacon lent itself to describe the newly-awakened spirit of scientific investigation, and though he ignored or affected to despise the results achieved by the great philosophers just mentioned, he learned from them enough to lay the foundation of a philosophy of inductive science, which, if we look at the course of scientific progress since his day, seems to have been almost prophetic. The difference between observation and experiment may be said to consist in this, that by observation we note and record the phenomena of nature as they are presented to us in her ordinary course; whereas by experiment we note phenomena presented under circumstances artificially arranged for the purpose. Experiment is thus the more powerful engine for discovery, since one judiciously conducted experiment may provide the data which could only result from a long course of observations.

OBSERVATORY, an institution supplied with instruments for accurately observing and recording the position of the heavenly bodies, and superintended by an astronomer, with usually one or more assistants. The objects to which the work of an observatory is directed are, 1st, The ascertainment of elements necessary to the science of theoretical and physical astronomy; 2d, The accurate measurement and publication of time. A third object, namely, the observation of meteorological phenomena, though not a necessary part of the work of an observatory, is often combined with the above. It often happens that the purpose for which a particular observatory is instituted has especial reference to *one* of the above objects, and in most observatories the character of the instruments possessed is more especially fitted for some classes of observations than for others. Since, therefore, almost every civilised country possesses one or more observatories of excellent character, the time of the observers in each is often better employed in carrying out those classes of observations for which they have special opportunities, than by attempting observations of more various kinds. Thus, almost every observatory has some distinctive feature of its own.

The ancients have made no mention of observatories, though we are told that Hipparchus made

his observations at Rhodes, and Ptolemy at Alexandria, the latter astronomer possessing the greatest collection of astronomical instruments then in use; so we are led to conclude, that among the ancients it was not the custom to erect houses exclusively adapted for astronomical observations. The case was very different with the Arabs, who erected observatories in all parts of their empire, the chief of which were those of Cairo, two in number; the Bagdad observatory; the celebrated one of Meraghah, superintended by Nazir-ed-din; and last, and greatest of all, that of Samarkand, erected by the celebrated Ulugh Beg (q. v.). Observatories are also found in various parts of China.

The principal instruments in general use in an observatory are the Transit Instrument (q. v.), the Mural Circle (see **CIRCLE, MURAL**), the Equatorial (q. v.), and the Sidereal Clock (q. v.). The altitude and azimuth instrument, or altazimuth (see **ALTITUDE**), is sometimes added, and the transit instrument and mural circle are sometimes combined in a single instrument called the transit circle. For meteorological observations, the principal instruments are the barometer, the thermometer, the rain-gauge, and the anemometer (q. v.), or instrument for measuring and registering the force and direction of the wind. We proceed to notice some of the principal existing observatories, more particularly those belonging to Britain.

The principal observatory in England is the Royal Observatory of Greenwich, under the direction of the Astronomer-Royal (now Mr Airy), with a staff at present of six assistants and six computers, with other supernumerary computers occasionally employed. The publications consist of a large volume yearly of observations in a reduced form, prepared under the superintendence of the astronomer-royal, the initials of the particular observer being given with each observation. The most important instrument in this observatory is the great transit circle, erected in the year 1850, and brought into use at the beginning of 1851. It was constructed by Messrs Ransomes and May as engineers, and Mr Simms as optician. The length of the telescope is nearly 12 feet, the clear aperture of the object-glass 8 inches, and the length of axis between the pivots 6 feet. For determining the error of collimation there are two horizontal telescopes, of about 5 feet focal length, and 4 inches aperture, one north, and the other south of the instrument. There is a chronographic apparatus, which registers the transits through a galvanic contact, made by the hand of the observer, on a paper stretched over a drum in connection with the sidereal clock. A massive altitude and azimuth instrument, erected in 1847, was constructed under the direction of the astronomer-royal, on peculiar principles of solidity and strength, for the purpose of making extra-meridional observations of the moon, which are effected by it with an accuracy equal to those made on the meridian. There are three telescopes in use, with equatorial mounting. The great equatorial was constructed by Messrs Ransomes and Sons as engineers, and Mr Simms as instrument-maker and optician. The object-glass by Messrs Merz and Son of Munich has a clear aperture of about 12½ inches, and a focal length of 16 feet 6 inches. The observatory at Greenwich was the first to employ galvanic signals on an extensive scale in the transmission of time. By this means, since the year 1852, a time-ball has been dropped on the dome of the Observatory, and also at the office of the Electric Telegraph Company in London, at precisely one o'clock. By means of the telegraph-wires, also, the longitude of the other principal observatories

the uses of the metals were well known, it was employed, in different parts of the world, for making arrow and spear heads, knives, &c. It is found in Iceland, the Lipari Isles, Vesuvius, Sardinia, Hungary, Spain, Teneriffe, Mexico, South America, Madagascar, Siberia, &c. Black O. was used by the ancients for making mirrors, and for this purpose was brought to Rome from Ethiopia. It was used for the same purpose in Peru and Mexico. Mirrors of Black O. are indeed still employed by artists. Chatoyant or Avantine O. is very beautiful when cut and polished, and ornaments made of it are sold at a comparatively high price.

O'BVERSE, or FACE, the side of a coin or medal which contains the principal device or inscription, the other side being in contradistinction called the Reverse. See NUMISMATICS.

OCCAM, WILLIAM OF, surnamed *Doctor Singularis et Invincibilis*, a famous schoolman, was born in England, at the village of Occam, in the county of Surrey, about the year 1270. We do not possess any precise or satisfactory knowledge of his early life. He is said to have been educated at Merton College, Oxford, and to have held several benefices in his native country, but soon after resigned them on entering the Franciscan order. Early in the 14th c., it is supposed he proceeded to Paris, where he attended the lectures of Duns Scotus, of whose philosophy he was afterwards the most formidable opponent. Here he soon became prominent by the boldness of his ecclesiastical views. Philippe, le Bel, king of France, having forbidden Pope Boniface VIII. to levy contributions in his dominions, the latter, by way of retaliation, excommunicated him. O. rushed to the defence of the monarch, and in his *Disputatio inter Clericum et Militem, super Potestate Prelatis Ecclesie atque Principibus Terrarum Commissa*, denies that the popes have any authority in temporal affairs, and boldly declares that all who favoured such a doctrine ought to be expelled from the church as heretics. Meanwhile, from being a listener, he had become a lecturer in philosophy. The system which he advocated—for he was not properly its originator—is known by the name of *Nominalism* (q. v.), but it had never before received so rigorously logical and rational a treatment; hence his epithet of *Invincibilis*. The work in which his views are set forth is entitled *Expositio Aurea, et admodum utilis super totam Artem Veterem*. It contains a series of commentaries upon the *Isagoge* of Porphyry, and on the *Categories* and *Interpretation* of Aristotle, with a special treatise headed *Tractatus Communis Porphyrii*, and a theological opusculum on Predestination. It is intended as a demolition of the moderns—i. e., the scholastics—and shews that in their method they have completely departed from the principles and methods of the great Stagyrte, for whom, like every sound and solid thinker, he shews the deepest respect and admiration. About 1320 or 1321, he again plunged into ecclesiastical controversy. A certain Narbonese priest, having affirmed that Jesus Christ and his apostles held everything in common, and that every ecclesiastical possession is a modern abuse, was pounced upon by the inquisitors, and defended by a certain Berenger Talon, a Franciscan monk of Perpignan. But Berenger's defence of apostolical poverty was naturally enough very disagreeable to the pope, John XXII., who therefore condemned it. Berenger was, however, vigorously supported by his order, and among others by Michael de Cesena, the general-superior, Bonagratia of Bergamo, and William of Occam, who attacked the pope with great vehemence and trenchant logic. Shortly after

they were arrested as favourers of heresy, and imprisoned in Avignon. But while their trial was proceeding, Michael de Cesena and O., knowing what little mercy or justice they had to expect from their accusers and judges, made their escape to the Mediterranean, and were received at a little distance off shore on board a galley of Ludwig, king of Bavaria, the patron of the Franciscan anti-pope, Peter of Corbaras, and one of the most powerful sovereigns in Europe. The remainder of O.'s life was spent at Munich, where, safe from the machinations of his enemies, he continued to assail at once the errors of papistry in religion, and of realism in philosophy. He died 7th April 1347. It is impossible to praise O. too highly. He was the first logician, and the most rational philosopher among the whole body of schoolmen. We are often reminded by his clear and vigorous common sense and wholesome incredulity, that he was the countryman of Locke and Hobbes, and that he came of a people ever noted for the solidity of their understanding. Besides the works already mentioned, O.'s principal writings are—*Dialogus in tres Partes distinctus, quarum prima de Hæreticis, secunda de Erroribus Joannis XXII., tertia de Potestate Papæ, Conciliorum et Imperatoris; Opus Nonaginta Dierum contra Errores Joannis XXII.; Compendium Errorum Joannis Papæ XXII.; Decisiones Octo Quæstionum de Potestate summi Pontificis; Super Quatuor Libros Sententiarum Subtilissimæ Quæstiones earumque Decisiones* (based on Peter the Lombard's famous *Sententia*, and containing nearly the entire theology of Occam. These *Decisiones* were long almost as renowned as the *Sententia*, which gave them birth); *Antiloquium Theologicum; Summa Logice ad Adamum; and Major Summa Logice*.—See Luke Wadding's *Scriptores Ordinis Minorum* (1650); Cousin's *Histoire de la Philosophie* (2d ed. 1840); and B. Hauréau's *De la Philosophie Scholastique* (1848).

OCCA'SIONALISM, or the doctrine of OCCASIONAL CAUSES (see CAUSE), is the name given to the philosophical system devised by Descartes and his school, for the purpose of explaining the action of mind upon matter, or, to speak more correctly, the combined, or at least the synchronous action of both. It is a palpable fact that certain actions or modifications of the body are accompanied by corresponding acts of mind, and *vice versa*. This fact, although it presents no difficulty to the popular conception, according to which each is supposed to act directly upon the other—body upon mind, and mind upon body—has long furnished to philosophers a subject of much speculation. But on the other hand, it is difficult to conceive the possibility of any direct mutual interaction of substances so dissimilar, or rather so disparate. And more than one system has been devised for the explanation of the problem, as to the relations which subsist between the mind and the body, in reference to those operations, which are clearly attributable to them both. According to Descartes and the Occasionalists, the action of the mind is not, and cannot be the cause of the corresponding action of the body. But they hold that whenever any action of the mind takes place, God directly produces, in connection with it, and by reason of it, a corresponding action of the body; and in like manner conversely, they explain the coincident or synchronous actions of the body and the mind. It was in opposition to this view that Leibnitz, believing the Cartesian system to be open to nearly equal difficulties with that of the direct action, devised his system of *Pre-established Harmony*. See LEIBNITZ. His real objection to the Occasionalist hypothesis is, that it supposed a

thick, in the various geological formations, and are occasionally worked, as at Shotover Hill, Oxford, in Holland, and many other places in Europe and America. Very remarkable beds are worked in Canada. The ochres so obtained are either calcined for use or not, according to the tint wanted. The operation adds much to the depth of colour, by increasing the degree of oxidation of the contained iron. The most remarkable varieties of ochre are the Siena Earth (Terra di Siena) from Italy; the so-called red chalk, with which sheep are marked; Dutch Ochre; Armenian Bole or Lemnian Earth; Italian Rouge, and Bitry Ochre. They vary in colour from an Isabelline yellow, through almost every shade of brown, up to a tolerably good red. The finest kinds are used by painters, the coarsest by carpenters for marking out their work, by farmers for marking cattle, &c.

O'CHRO. See **HIBISCUS**.

OCKMUL'GEE, a river in Georgia, U. S., which rises in the northern centre of the state by three branches, and after a course of 200 miles south-south-east, joins the Oconee, to form the Altamaha. It is navigable to Macon, 130 miles above its mouth.

OCO'NEE, a river of Georgia, U. S., rises in the north-east part of the state, and flows southerly 250 miles, where it unites with the Ockmulgee to form the Altamaha; it is navigable to Milledgeville, 100 miles.

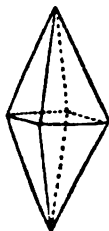
O'CONNELL, DANIEL, eldest son of Mr Morgan O'Connell of Darrynane, near Cahirciveen, in the county of Kerry, Ireland, was born August 9, 1775. His family was ancient, but straitened in circumstances. O'C. received his first education from a hedge-schoolmaster, and after a further training under a Catholic priest in the county of Cork, was sent in 1790 to the English College at St Omer. His school reputation was very high; but he was driven home prematurely by the outbreak of the Revolution, and in 1794, entered as a law-student at Lincoln's Inn. In 1798, he was called to the bar; and it was the boast of his later career as an advocate of the Repeal of the Union with England, that his first public speech was delivered at a meeting in Dublin, convened for the purpose of protesting against that projected measure. He devoted himself assiduously, however, to the practice of his profession, in which he rose steadily. By degrees, the Roman Catholic party having begun to rally from the prostration into which they had been thrown through the rebellion of 1798 and its consequences, O'C. was drawn into public political life. In all the meetings of his co-religionists for the prosecution of their claims, he took a part, and his unquestioned ability soon made him a leader. He was an active member of all the successive associations which, under the various names of 'Catholic Board,' 'Catholic Committee,' 'Catholic Association,' &c., were organised for the purpose of procuring the repeal of the civil disabilities of the Catholic body. Of the Catholic Association he was himself the originator; and although his supremacy in its councils was occasionally challenged by some aspiring associates, he continued all but supreme down to its final dissolution. By means of this association, and the 'Catholic Rent' which it was enabled to raise, he created so formidable an organisation throughout Ireland, that it gradually became apparent that the desired measure of relief could not longer be safely withheld; and the crisis was precipitated by the bold expedient adopted by O'C., of procuring himself to be elected member of parliament for Clare in 1823, notwithstanding his well-known legal incapacity to serve in parliament, in consequence of his being obliged to refuse the

prescribed oaths of abjuration and supremacy, which then formed the ground of the exclusion of Roman Catholics from the legislature. This decisive step towards the settlement of the question, although it failed to procure for O'C. admission to parliament, led to discussions within the House, and to agitations outside, so formidable, that in the beginning of the year 1829, the Duke of Wellington and Sir Robert Peel found it expedient to give way; and, deserting their former party, they introduced and carried through, in the spring of that year, the well-known measure of Catholic Emancipation. O'C. was at once re-elected, and took his seat for Clare, and from that date until his death continued to sit in parliament. He was elected for his native county in 1830, for the city of Dublin in 1836, for the town of Kilkenny in 1836 (having been unseated for Dublin on petition), for Dublin again in 1837, and for the county of Cork in 1841. During all these years, having entirely relinquished his practice for the purpose of devoting himself to public affairs, he received, by means of an organised annual subsidy, a large yearly income from the voluntary contributions of the people, by whom he was idolised as their 'Liberator;' and who joined with him in all the successive agitations against the act of Union, against the Protestant Church establishment, and in favour of reform, in which he engaged. In the progress of more than one of these political agitations, his associations were suppressed by the government; and the agitation for a Repeal of the Union, recommenced in 1841, and carried on by 'monster meetings' throughout Ireland, at which O'C. himself was the chief speaker, assumed proportions so formidable, that he, in common with several others, was indicted for a seditious conspiracy, and after a long and memorable trial, was convicted, and sentenced to a year's imprisonment, with a fine of £2000. This judgment was reversed by the House of Lords; and O'C., on his discharge, resumed his career; but his health had suffered from confinement, and still more from dissensions and opposition in the councils of his party; and as, on the return of the Whigs to power in 1846, he consented to support their government, the malcontents of the Repeal Association openly separated from him, and a bitter feud between 'Young' and 'Old' Ireland ensued. In this quarrel, O'C. steadfastly maintained his favourite precept of 'moral force,' and was supported by the great body of the Catholic bishops and clergy; but his health gave way in the struggle. He was ordered to try a milder climate; and on his journey to Rome in the spring of 1847, he was suddenly seized with paralysis, and died at Genoa on the 15th May of that year. His eminence as a public speaker, and especially as a master of popular eloquence, is universally admitted. Into the controversies as to his public and political character, it is not our place to enter here. His speeches unfortunately were for the most part extempore, and exist but in the reports (uncorrected by himself) taken at the time. He published but a single volume, *A Memoir of Ireland, Native and Saxon*, and a few pamphlets; the most important of which, as illustrating his personal history and character, is *A Letter to the Earl of Shrewsbury*.—See *Life and Times of Daniel O'Connell*, by his son, John O'Connell; also *Recollections of Daniel O'Connell*, by John O'Neill Daniel; and *Fagan's Life of Daniel O'Connell*.

O'CTAGON, a plane closed figure of eight sides. When the sides are equal, and also the angles, the figure is called a 'regular octagon;' in this case, each angle is 135°, or equal to three half right angles. If the alternate corners of a regular octagon be joined, a square is constructed; and as the angle contained

between the sides of the square and of the octagon is one-fourth of a right angle, the octagon may easily be constructed from the square as a basis.

OCTAHEDRON (Gr. *okto*, eight, *hedra*, base) is a solid figure bounded by eight triangles, and having twelve edges and six angles. A regular octahedron has its eight triangular faces all equilateral, and may, for convenience, be defined as a figure composed of two equal and similar square pyramids with equilateral triangles for their sides placed base to base. This solid is symmetrical round any angle, and is one of Plato's five regular solids. The octahedron appears in nature as one of the forms of crystals of sulphur.



Octahedron.

OCTAVE (Lat. *octavus*, eighth), the interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself as well as to the interval. There is between a note and its octave a far closer relation than between any other two notes; they go together almost as one musical sound. In combination, they are hardly distinguishable from one another, and their harmonics agree invariably, a coincidence which occurs in the case of no other interval.

OCTAVIA, the sister of the Roman emperor Augustus, and wife of Mark Antony. She was distinguished for her beauty, her noble disposition, and womanly virtues. Her first husband was C. Marcellus, to whom she was married 50 B.C. He died 41 B.C., shortly after which she consented to marry Antony, to make secure the reconciliation between him and her brother. The event was hailed with joy by all classes. In a few years, Antony became tired of his gentle and virtuous spouse, and forsook her for Cleopatra. When the Parthian War broke out, O. wanted to accompany her husband, and actually went as far as Corcyra, whence Antony sent her home, that she might not interrupt his guilty intercourse with the Egyptian queen. In 35 B.C., O. made an effort to rescue him from a degradation that was indifferent even to the honour of the Roman arms, and sailed from Italy with reinforcements; but a message reached her at Athens ordering her to return home. She proudly obeyed, but, with a magnanimity that reminds us of the Roman character in earlier and better days, she forwarded the supports to her husband. Her brother, Octavian, was indignant at the treatment she received, and would have had her quit her husband's house, and come and live with him; but she refused. In 32 B.C., war, long inevitable, broke out between Antony and Octavian; and the former crowned his insults by sending O. a bill of divorce. But no injury was too great to be forgiven by this 'patient Grizel' of the ancient world; and after her husband's death, she brought up with maternal care not only her own children, but also Cleopatra's bastards. Her death took place 11 B.C.

OCTOBER (Lat. *octo*, eight) was the eighth month of the so-called 'year of Romulus,' but became the tenth when (according to tradition) Numa changed the commencement of the year to the first of January, though it retained its original name. It has since maintained its position as the tenth month of the year, and has 31 days. October preserved its ancient name notwithstanding the attempts made by the Roman senate, and the emperors Commodus and Domitian, who substituted for a time the terms *Faustinus*, *Invictus*,

Domitianus. Many Roman and Greek festivals fell to be celebrated in this month, the most remarkable of which was the sacrifice at Rome of a horse (which was called *October*) to the god Mars. The other festivals were chiefly bacchanalian. Among the Saxons, it was styled *Wyn moneth* or the wine month.

OCTOPODA (Gr. eight-footed), a section of dibranchiate cephalopods (see *CEPHALOPODA*), having the body in general very short, the head very distinct; eight arms, not very unequal, furnished with simple suckers; with or without a shelly covering. To this section belong *Argonauta*, *Poulpa*, &c. See these heads.

OCTOSTYLE, the name given in classic architecture to a portico composed of eight columns in front.

OCTROI (Lat. *auctoritas*, authority), a term which originally meant any ordinance authorised by the sovereign, and thence came to be restrictively applied to a toll or tax in kind levied from a very early period in France, and other countries of Northern Europe, on articles of food which passed the barrier or entrance of a town. The right to levy this toll was often delegated to subjects, and in order to increase its amount, a device was resorted to of raising the weight of the pound in which the octroi was taken. The large pound, an ounce heavier than that in ordinary use, was called the *livre d'octroi*, whence the expression *pound troy*. The octroi came eventually to be levied in money, and was abolished in France at the Revolution. In 1798, it was re-established, under the pretext that it was required for purposes of charity, and called the *octroi de bienfaisance*, and it has been reorganised in 1816, 1842, and 1852. Of the octroi duty which is at present levied at the gates of the French towns, one-tenth goes to the imperial treasury, and the rest to local expenses. The octroi officers are entitled to search all carriages and individuals entering the gates of a town. From the octrois of Paris alone government derives a revenue of about 56 million francs. In 1860, the Belgian government acquired great popularity by abolishing the octroi.

The epithet *octroyé* is applied by continental politicians to a constitution granted by a prince, in contradistinction to one which is the result of a pact between the sovereign and the representatives of the people. Any public company possessing an authorised monopoly like that held by the East India Company, is said to be *octroyé*.

OD (from the same root as *Odin*, and supposed to mean all-pervading), the name given by Baron Reichenbach (q. v.) to a peculiar physical force which he thought he had discovered. This force, according to him, pervades all nature, and manifests itself as a flickering flame or luminous appearance at the poles of magnets, at the poles of crystals, and wherever chemical action is going on. This would account for the luminous figures said to be sometimes seen over recent graves. The od force has positive and negative poles, like magnetism. The human body is od-positive on the left side, and od-negative on the right. Certain persons, called 'sensitives,' can see the odic radiation like a luminous vapour in the dark, and can feel it by the touch like a breath. As the meeting of like odic poles causes a disagreeable sensation, while the pairing of unlike poles causes a pleasant sensation, we have thus a sufficient cause for those likings and antipathies hitherto held unaccountable. Some sensitive persons cannot sleep on their left side (in the northern hemisphere), because the north pole of the earth, which is od-negative, affects unpleasantly the od-negative left side. All motion generates od;

why, then, may not a stream running underground affect a sensitive water-finder, so that the divining-rod in his or her hand shall move without, it may be, any conscious effort of will? All the phenomena of mesmerism are ascribed to the workings of this od-force. Reichenbach does not pretend to have had the evidence of his own senses for any of those manifestations of his assumed od-force; the whole theory rests on the revelations made to him by 'sensitives.' It may be added, that few if any really scientific men have any belief in the existence of such a force.—Those curious in such matters are referred for the details of the subject to Reichenbach's large work, translated into English by Dr Ashburner, under the title of *The Dynamics of Magnetism*, or to a briefer account in his *Odisch-Magnetische Briefe* (Stutt. 1852).

ODAL or UDAL RIGHT (Celtic *od*, property), a tenure of land which was absolute, and not dependent on a superior, and prevailed throughout Northern Europe before the rise of feudalism. It was founded on the tie of blood which connected freeman with freeman, and not on the tie of service. It was the policy of the sovereign authority everywhere to make it advantageous for the freemen to exchange the odal tie for the tie of service—a change which paved the way for the feudal system. The odallers of Orkney were allowed to retain or resume their ancient privileges, on paying a large contribution to the erection of St Magnus's Cathedral at Kirkwall; and the Odal tenure prevails to this day to a large extent in the Orkney and Shetland Islands, the right to land being completed without writing by undisturbed possession proved by witnesses before an inquest.

ODD-FELLOWS, the name assumed by one of the most extensive self-governed provident associations in the world. The institution was originated in Manchester in 1812, although isolated 'lodges' had existed in various parts of the country for some time previously. These latter were generally secret fraternities, humble imitations of Freemasonry—adopting a similar system of initiatory rites, phraseology, and organisation—instituted for social and convivial purposes, and only occasionally extending charitable assistance to members. On its institution in Manchester, the main purpose of Odd-fellowship was declared by its laws to be, 'to render assistance to every brother who may apply through sickness, distress, or otherwise, if he be well attached to the Queen and government, and faithful to the order;' and this continues to be the basis of all its operations. It still, however, retains some of the characteristics of Freemasonry, in possessing pass-words and peculiar 'grips,' whereby members can recognise one another. The headquarters of the society is at Manchester, where reside the Grand Master and Board of Directors of the 'Manchester Unity of the Independent Order of Odd-fellows.' In January 1852, the total number of members was 224,441; in January 1864, the number was 358,556; and during 1863, 15,603 new members joined. The lodges number 3555, spread over 440 districts; the annual income being about £350,000, with an expenditure of nearly £300,000. Should any lodge fail to meet its legitimate obligations, the district becomes liable; failing the district, the responsibility falls upon the entire Unity. The order is widely spread over the whole of England and Scotland. It exists independently in America, Australia, New Zealand, and the West Indies; but there are 'lodges' in Philadelphia, New York, in all the British colonies, and one in Constantinople (originated in 1862), which are affiliated to and in connection with the Manchester

Board. These wide spread ramifications of this society enable emigrant members to be at once received into fellowship in those countries. In the American states, Odd-fellowship is said to exercise considerable political influence. A quarterly periodical, called the *Odd-fellows' Magazine*, devoted to its interests, is published in Manchester. In an early number of this publication, an Odd-fellow is described as 'like a fox for cunning, a dove for tameness, a lamb for innocence, a lion for boldness, a bee for industry, and a sheep for usefulness.'

ODE (Gr. a song) originally meant any lyrical piece adapted to be sung. In the modern use of the word, odes are distinguished from songs by not being necessarily in a form to be sung, and by embodying loftier conceptions and more intense and passionate emotions. The language of the ode is therefore abrupt, concise, and energetic; and the highest art of the poet is called into requisition in adapting the metres and cadences to the varying thoughts and emotions. Hence the changes of metre and versification that occur in many odes. The rapt state of inspiration that gives birth to the ode, leads the poet to conceive all nature as animated and conscious, and, instead of speaking about persons and objects, to address them as present.

Among the highest examples of the ode are the *Song of Moses* and several of the psalms. Dryden's *Alexander's Feast* is reckoned one of the first odes in the English language. We may mention, as additional specimens, Gray's *Bard*, Collins's *Ode to the Passions*, Burns's *Scots wha hae*, Coleridge's *Odes to Memory and Dependancy*, Shelley's *Ode to the Skylark*, and Wordsworth's *Ode on the Recollections of Immortality in Childhood*.

O'DENSEE (anciently known as Odin's-Ey, or Odin's Oe (i. e., Odin's Island), the chief town of the Danish island of Fünen, and the oldest city of the kingdom, is situated in the amt or district of the same name, in 55° 25' N. lat., and 10° 20' E. long. Pop. (1860) 14,255. O., which is the seat of the governor of the island and the see of a bishop, has a gymnasium, several literary societies, and is an active, thriving provincial town. A bishopric was founded here in 988, prior to which time O. bore the reputation of being the first city established by Odin and his followers. The cathedral, founded in 1086 by St Knud, whose remains, like those of several of the early Danish kings, were deposited here, is a fine specimen of the early simple Gothic style. The lay convent or college for ladies contains an extensive library, furnished with copies of all printed Danish works. At O., a diet was held in 1527, in which the Reformed or Lutheran doctrines were declared to be the established creed of Denmark, and equality of rights was granted to Protestants; while another diet held there in 1539 promulgated the laws regulating the affairs of the Reformed Church.

O'DENWALD. See HESSE-DARMSTADT.

O'DER (Lat. *Viadrus*, Slavon. *Vjodr*), one of the principal rivers of Germany, rises in the Leselberg on the table-land of Moravia, more than 1000 feet above the level of the sea, and enters Prussian Silesia at Odersberg, after a course of some 60 miles. After traversing Brandenburg in a north-west direction, it crosses Pomerania, and empties itself into the Stettiner Haff, from whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which enclose the islands of Wollin and Usedom. The O. has a course of more than 500 miles, and a river-basin of 50,000 square miles. The rapid flow of this river, induced by its very considerable fall, is accelerated by the effluence

followed in recent times by the historian Suhm, is, that O. was a chief of the *Cesir*, a Scythian tribe, who, fleeing before the ruthless aggressions of the Romans, passed through Germany to Scandinavia, where, by their noble appearance, superior prowess, and higher intelligence, they easily vanquished the inferior races of those lands, and persuaded them that they were of godlike origin. According to one tradition, O. conquered the country of the Saxons on his way; and leaving one of his sons to rule there, and introduce a new religion, in which he, as the chief god *Wuotan*, received divine honours, advanced on his victorious course, and making himself master of Denmark, placed another son, *Skjold*, to reign over the land, from whom descended the royal dynasty of the *Skjoldingar*. He next entered Sweden, where the king, *Gylfi*, accepted his new religion, and with the whole nation worshipped him as a divinity, and received his son *Yugni* as their supreme lord and high-priest, from whom descended the royal race of the *Yuglingars*, who long reigned in Sweden. In like manner he founded, through his son *Sceming*, a new dynasty in Norway; and besides these, many sovereign families of Northern Germany, including our own Saxon princes, traced their descent to *Odin*. As it has been found impossible to refer to one individual all the mythical and historical elements which group themselves around the name of O., *Wodin*, or *Wuotan*, it has been suggested by Suhm and other historians, that there may have been two or three ancient northern heroes of the name; but notwithstanding the conjectures which have been advanced since the very dawn of the historical period in the north in regard to the origin and native country of the assumed O., or even the time at which he lived, all that relates to him is shrouded in complete obscurity. It is much more probable, however, that the myth of O. originated in nature-worship. See SCANDINAVIAN MYTHOLOGY.

ODOACER (also *ODOVACER*, *ODORAGAR*, *ODOVACHAR*, *OTACHAR*, &c., and, according to St Martin, the same as *OTTOCHAR*, a name frequent in Germany during the middle ages), the ruler of Italy from the year 476 to 493, was the son of *Edecon*, a secretary of *Attila*, and one of his ambassadors to the court of Constantinople. This *Edecon* was also captain of the *Scyri*, who formed the bodyguard of the king of the *Huns*. After the death of *Attila*, he remained faithful to the family of his master, but perished about 463 in an unequal struggle with the *Ostrogoths*. He left two sons, *Onulf* and *Odoacer*, the former of whom went to seek his fortune in the East; while O., after leading for some time the life of a bandit chief among the *Noric Alps*, determined to proceed to Italy, whither barbarian adventurers were flocking from all Europe. According to a monkish legend, a pious hermit, *St Severinus*, whom he went to visit before his departure, prophesied his future greatness. O. entered the military service of the Western Roman Empire, and rapidly rose to eminence. He took part in the revolution by which *Orestes* (475) drove the Emperor *Julius Nepos* from the throne, and conferred on his son *Romulus* the title of *Augustus*, which the people scoffingly changed into *Augustulus*. He soon perceived the weakness of the new ruler, and resolved to profit by it. He had little difficulty in persuading the barbarian soldiery, who had effected the revolution, that Italy belonged to them, and in their name demanded of *Orestes* the third part of the land, as the reward of their help. This *Orestes* refused; and O., at the head of his *Herulians*, *Rugians*, *Turcilingians*, and *Scyri*, marched against *Pavia*, which *Orestes* had garrisoned, stormed the city, and put his opponent to death (476). *Romulus* abdicated, and withdrew into obscurity. What

became of him, is not known. Thus perished the Roman empire. O. shewed himself to be a wise, moderate, and politic ruler, quite unlike our general notion of a barbarian. In order not to offend the Byzantine emperor *Zeno*, he took the title of king only, and caused the senate to despatch to Constantinople a flattering letter, in which it declared one emperor to be enough for both East and West; renounced its right of appointing the emperors, expressed its confidence in the civil and military talents of O., and begged *Zeno* to confer upon him the administration of Italy. After some hesitation, the Byzantine emperor yielded to the entreaties of the senate, and O. received the title of *Patricius*. He fixed his residence at *Ravenna*. According to his promise, he divided among his companions the third part of the land of Italy—a measure far less unjust than at first sight may seem, for the peninsula was then almost depopulated, and many domains were lying waste and ownerless. This barbarian ruler did everything in his power to lift Italy out of the deplorable condition into which she had sunk, and to breathe fresh life into her municipal institutions—those venerable relics of nobler days! He even re-established the consulate, which was held by eleven of the most illustrious senators in succession, maintained peace throughout the peninsula, overawed the Gauls and Germans, and reconquered *Dalmatia* and *Noricum*. In religion, though an Arian himself, he acted with a kingly impartiality that more orthodox monarchs have rarely exhibited. *Gibbon* remarks, with his usual pointed sarcasm, that the silence of the Catholics attests the toleration which they enjoyed. The valour, wisdom, and success of O. appear to have excited the jealousy and alarm of *Zeno*, who encouraged *Theodoric*, king of the *Ostrogoths*, a still greater warrior and sovereign than O. himself, to undertake an expedition against Italy. The first battle was fought on the banks of the *Isontius* (mod. *Isonzo*), 28th August 489. O. was beaten, and retreated. During his retreat, he hazarded another battle at *Verona*, and was again beaten. He now hastened to *Rome*, to rouse the inhabitants, but the gates of the city were closed against him. Returning northwards to his capital, *Ravenna*, he reassembled the wrecks of his army, and in 490 once more marched against the *Ostrogoths*, whose advance-guard he defeated, and pursued to the walls of *Pavia*. Another great battle now took place on the banks of the *Adda*, when O. was vanquished for the third time. He now shut himself up in *Ravenna*, where *Theodoric* besieged him for three years. O. then capitulated, on condition that the kingdom of Italy should be shared between him and *Theodoric*. This agreement was solemnly sworn to by both parties, 27th February 493; but on the 5th of March, O. was assassinated at a feast, either by *Theodoric* himself, or by his command.

ODOMETER (Gr. *odos*, a road, *mētērōn*, a measure), also called *Perambulator*, or *surveying-wheel*, is an instrument attached to a carriage or other vehicle, for the purpose of registering the distance it has travelled. Such machines have been in use from an early period, and one is described by *Vitruvius* in that part of his work *De Architectura* which is devoted to machines. The instrument, as commonly employed, consists of a train of wheel-work, which communicates motion from the axle of the carriage wheel to an index which moves round the circumference of a dial fixed in one side of the carriage over the axle. The wheel-work is arranged so as to produce a great diminution of the velocity impressed by the axle of the vehicle, and the dial is so graduated that the index can shew the number of miles, furlongs, yards, &c., traversed. The instrument

Œdema may be either passive or active, the former being by far the most common. *Passive Œdema* arises from impeded venous circulation (as from obstruction or obliteration of one or more veins; from varicose veins; from standing continuously for long periods, till the force of the circulation is partly overcome by the physical action of gravitation; from deficiency in the action of the adjacent muscles, which in health materially aids the venous circulation, &c.); from too weak action of the heart (as in dilatation or certain forms of valvular disease of that organ); or from a too watery or otherwise diseased state of the blood (as in chlorosis, scurvy, Bright's disease, &c.). By means of the knowledge derived from pathological anatomy, we can often infer the cause from the seat of the swelling; for example, œdema of the face, usually commencing with the eyelids, is commonly caused by obstruction to the circulation through the left side of the heart, or by the diseased state of the blood in Bright's disease; and œdema of the lower extremities most commonly arises from obstruction in the right side of the heart, unless it can be traced to the pressure of the gravid uterus, or of accumulated feces in the colon, or to some other local cause.

Active Œdema is associated with an inflammatory action of the cellular tissue, and is most marked in certain forms of erysipelas. It is firmer to the touch, and pressure with the finger produces less pitting than in the passive form.

From the preceding remarks, it will be seen that œdema is not a disease, but a symptom, and often a symptom indicating great danger to life. The means of removing it must be directed to the morbid condition or cause of which it is the symptom.

ŒDIPUS (Gr. *Oidipous*), the hero of a celebrated legend, which, though of the most revolting nature in itself, has supplied both Euripides and Sophocles with the subject-matter of some of their most celebrated tragedies. The story, as generally related, is as follows: O. was the son of Laius, king of Thebes, by Jocaste; but his father having consulted the oracle to ascertain whether he should have any issue, was informed that his wife would bring forth a son, by whom he (Laius) should ultimately be slain. Determined to avert so terrible an omen, Laius ordered the son which Jocaste bore him to have his feet pierced through, and to be exposed to perish on Mount Cithæron. In this helpless condition, Œ. was discovered by a herdsman, and conveyed to the court of Polybus, king of Corinth, who, in allusion to the swollen feet of the child, named him *Œdipus* (from *oideo*, to swell, and *pous*, the foot); and along with his wife, Merope, brought him up as his own son. Having come to man's estate, Œ. was one day taunted with the obscurity of his origin, and in consequence proceeded to Delphi, to consult the oracle. The response which he received was, that he would slay his father, and commit incest with his mother. To escape this fate, he avoided returning to Corinth, and proceeded to Thebes, on approaching which he encountered the chariot of his father; and the charioteer ordering him out of the way, a quarrel ensued, in which Œ. ignorantly slew Laius, and thus unconsciously fulfilled the first part of the oracle. The famous Sphinx (q. v.) now appeared near Thebes, and seating herself on a rock, propounded a riddle to every one who passed by, putting to death all who failed to solve it. The terror of the Thebans was extreme, and in despair they offered the kingdom, together with the hand of the queen, to the person who should be successful in delivering it from the monster. Œ. came

forward; the Sphinx asked him, 'What being has four feet, two feet, and three feet; only one voice; but whose feet vary, and when it has most, is weakest?' Œ. replied that it was 'Man;' whereupon the Sphinx threw itself headlong from the rock. Œ. now became king, and husband of his mother, Jocaste. From their incestuous union sprung Eteocles, Polynices, Antigone, and Ismene. A mysterious plague now devastated the country, and when the oracle declared that before it could be stayed, the murderer of Laius should be banished from the country, Œ. was told by the prophet Tiresias that he himself had both murdered his father and committed incest with his mother. In his horror he put out his own eyes, that he might no more look upon his fellow-creatures, while Jocaste hanged herself. Driven from his throne by his sons and his brother-in-law, Creon, Œ. wandered towards Attica, accompanied by Antigone, and took refuge in the grove of the Eumenides, who charitably removed him from earth; but the latter part of his life is differently told.

ŒHLENSCHLÄGER, ADAM GOTTLÖB, the greatest poet of Northern Europe, was born in 1779 at Copenhagen. His early years were spent at the palace of Fredericksborg, in the neighbourhood of the Danish capital, where his father was employed, first as organist, and afterwards as steward or bailiff. During the absence of the royal family in the winter, Œ. and his sister amused themselves in roaming over the palace, and examining the paintings and works of art which it contained, and in improvising private theatricals, for which he supplied original pieces. After an irregular and desultory course of education, Œ.'s love of the drama led him to offer his services to the manager of the Copenhagen theatre; but discovering soon that he had no chance of rising above the rank of a mere supernumerary, he entered the university of Copenhagen as a student of law. For a time, he seems to have pursued his studies with tolerable assiduity, under the direction of his friend, A. S. Oersted, who, together with his distinguished brother, H. C. Oersted (q. v.) had cemented a lifelong friendship with him. Œ.'s studies were interrupted in 1801, when, on the bombardment of Copenhagen by Nelson and Parker, he and his friends served in the student-corps of volunteers. After this event, which roused the dormant patriotism of the nation, Œ. found the study of law too irksome, and devoted all his energies to the cultivation of the history and mythology of his own country. In 1803, appeared his first collection of poems, including one longer dramatic piece, *St Hans Aften-Spil*, which attracted favourable notice for the lively fancy with which national habits and local characteristics were portrayed. The *Vaulunders Saga* in the *Poetiske Skrifter*, published in 1805, and his *Aladdin's forunderlige Lampe*, completed his successes, and raised him to the rank of the first of living Danish poets; the former of these works having shewn a marvellous capacity for reflecting the dark and stern colouring of the old northern Sagas, while the latter gave evidence of a rich and genial poetic fancy. These early efforts were rewarded by the acquisition of a travelling pension, which enabled him to spend some years in visiting various parts of the continent, and becoming acquainted with the great literary celebrities of the day, such as the Weimar circle of whom Goethe was the head. Œ. was not idle with his pen during this period of comparative recreation, for in 1807 he wrote his *Hakon Jarl*, the first of his long series of northern tragedies, at Halle; and in 1809, he composed his *Correggio* at Rome. In 1810, Œ. returned to Denmark, where he was hailed with acclamation

as the greatest tragic poet Denmark had ever known; and having soon afterwards obtained the chair of æsthetics at the university, and received various substantial proofs of royal favour, he married, and settled in the capital, where his peace was, however, rudely disturbed by a literary feud with Baggensen, the Danish poet and critic, whose poetical supremacy had been superseded by that of Ehlerschläger. In 1819 appeared one of OE's most masterly productions, *Nordens Guder*, and this and the numerous dramatic compositions written about the same period, shew that the severe criticism to which his writings had been exposed during the celebrated Baggensen quarrel, had corrected some of the faults, and lessened the self-conceit which had characterised his earlier works. His reputation spread with his increasing years both abroad and at home; and after having repeatedly visited the more southern parts of Europe, he went in 1829 to Sweden, where his arrival was welcomed by a public ovation; and after having received repeated marks of friendship from various sovereigns, he was honoured in his own country by the celebration, in 1849, of a grand public festival held in the palace at Copenhagen. But this ovation was unfortunately followed in less than two months by his death, which took place in January 1850. His funeral was kept as a national solemnity, and he was followed to the grave by a civic procession, which included members of every class of society, from princes to artisans. The fame of OE will rest principally on his tragedies, of which he wrote 24, 19 of the number being on northern subjects. These were all composed originally in Danish, and re-written by himself in German. Besides those already referred to, the best are *Knud den Større*, *Palnatoke*, *Æd og Walborg*, *Væringerne i Miklagord*. His poems are for the most part indifferent, and his numerous prose writings deserve little notice. His Danish and German works amount in all to 62 volumes, to which must be added 4 volumes of his *Eriadringer*, or *Autobiographical Recollections*, published after his death.

CEL DE BœUF, a French term literally signifying ox's eye, applied in architecture to those small round or oval openings in the frieze or roof of large buildings, which serve to give light to spaces otherwise dark. The most famous is that in the anteroom (where the courtiers waited) of the royal chamber at Versailles, which gave name to the apartment. Hence the expression, *Les Fantes de l'Œil-de-Bœuf*—i.e., the history of the courtiers of the Grand Monarque, and by extension, of courtiers in general.

OE'LAND, a long and narrow island in the Baltic, lying off the eastern coast of Sweden, opposite to, and forming part of, the län of Kalmar, and at a distance of from 4 to 17 miles from the shore. It is 85 miles in length, and from 2 to 8 miles in breadth. The area is 588 square miles, and the pop. 35,000. The island, which is scarcely more than a lime cliff, is scantily covered with soil, but in some parts it is well wooded, and has good pasture-ground, which is turned to account by the islanders, who rear cattle, horses, and sheep. In favourable seasons, barley, oats, and flax yield good crops. The fishing is excellent all round the coast. There are large alum-works on the island, and an extensive line of wind-mills along the range of the Alvar Hills, near which stands Borgholm (pop. 673), the only town on the island, the first foundations of which were laid in 1817. To the south of the island lies the steep but wooded island-cliff, the Jungfruen, or Blaskulla, which bears the mythical reputation of having been the scene of

various deeds of witchcraft, and the favourite resort of wizards and witches.

OELS, a small town of Prussian Silesia, stands on a plain on the Oelze, or Oelse, 16 miles east-north-east of Breslau. Its castle, built in 1558, is surrounded by ramparts and ditches. It contains a gymnasium, several churches, and other public edifices. Pop. 6638, who carry on manufactures of linens and cloth goods.

ŒNANTHYLIC ACID ($C_{17}H_{33}O_2$.HO) is one of the volatile fatty acids of the general formula $C_nH_{2n+1}O_2$. It is a colourless oily fluid, with an aromatic odour, lighter than water, and insoluble in that fluid, but dissolving readily in alcohol and ether. According to Miller (*Organic Chemistry*, 2d ed. p. 355), it may be exposed to a cold of 0° without becoming solid; while it boils and may be distilled (with partial decomposition) at 298° . It is (like many of the allied fatty acids) one of the products of the oxidation of Oleic Acid (q.v.) by nitric acid, and is likewise yielded by the action of nitric acid on castor oil, wax, and various fats. Its most characteristic salt is the œnanthylate of copper, which crystallises in beautiful green needles.

ŒNOTHERA, a genus of plants of the natural order *Onagraceæ* (q.v.), having four petals and eight stamens, the calyx-limb 4-cleft, the segments reflexed; the capsule 4-valved, with many naked seeds. The *EVENING PRIMROSE* (*Œ. biennis*), a native of Virginia, has been known in Europe since 1614, and is now naturalised in many parts of Europe.

Evening Primrose (*Œnothéra biennis*):

a, flower divested of calyx and corolla, to show the parts of fructification; b, tuberous root.

and in some parts of Britain, on the banks of rivers, in thickets, on sandy grounds, &c. It is a biennial plant, and produces in the first year elliptic or obovate obtuse leaves, and in the second year a stem of 14–4 feet high, which bears at its summit numerous yellow flowers in a leafy spike. The flowers are fragrant in the evening. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy, and tender; it is eaten in salads or in soups, and as a boiled vegetable. The plant is often cultivated for the sake of its large yellow flowers. Several other species of *Œnothéra*, natives of North America, are occasionally cultivated in our gardens, and have establis and pleasant roots.

OEREBRO, an inland town of Sweden, capital of a län of the same name, is situated at the entrance of the Swart-Elf into the Hailmar Lake,

100 miles west of Stockholm. Pop. in 1861, 7742. The town still retains many memorials of its earlier prosperity, when it was frequently the residence of the Swedish rulers, who found its central position in the more fertile southern portion of the kingdom favourable both in regard to safety and pleasantness of site. The old castle was built by Berger Jarl in the 13th c., and was in after-times frequently chosen as the seat of the national diets. O. has manufactories of wax-cloth, carpets, woollen goods, stockings, guns, and mirrors; and these industrial products, together with the minerals obtained from the neighbouring silver, copper, and iron mines, are conveyed to Gothenborg and Stockholm by means of the extensive system of canals which connects the lakes of the interior with the maritime ports.

OERSTED, HANS CHRISTIAN, one of the most distinguished scientific discoverers and physicists of modern times, was born in 1777 at Rudkjøbing, on the Danish island of Langeland, where his father practised as an apothecary. In 1794, he entered the university of Copenhagen, where he took the degree of doctor of philosophy in 1799, and soon afterwards became assistant to the professor of medicine, in which capacity he gave lectures on chemistry and natural philosophy. In 1806, after having enjoyed a travelling scholarship for several years, and visited Holland, the greater part of Germany, and Paris, he was appointed extraordinary professor of natural philosophy in the university of Copenhagen. In 1812 he again visited Germany and France, after having published a manual under the title of *Videnskaben om Naturen's Almindelige Love*, and *Første Indledning til den Almindelige Naturlære* (1811). During his residence at Berlin, he wrote his famous essay on the identity of chemical and electrical forces, in which he first developed the ideas on which were based his great discovery of the intimate connection existing between magnetism and electricity and galvanism—a treatise which, during his residence in Paris, he translated into French, in conjunction with Marcel de Serres. In 1819, he made known these important truths in a Latin essay, entitled *Experimenta circa Efficaciam Conflictus Electrici in acum Magneticam*, which he addressed to all the scientific societies and the leading savans of Europe and America, and thus made good his claim to be regarded as the originator of the new science of electro-magnetism. This discovery, which formed one of the most important eras in the history of modern physical science, obtained for O. the Copley Medal from the Royal Society of England, and the principal mathematical prize in the gift of the Institute of Paris. The original and leading idea of this great discovery had been in his mind since 1800, when the discovery of the galvanic battery by Volta had first led him to enter upon a course of experiments on the production of galvanic electricity. The enunciation of his theory of electro-magnetism was followed by many important experiments in regard to the compression of water, and by numerous other chemical discoveries, among which we may instance his demonstration of the existence of the metal aluminium in alumina. The influence which O. exerted on the science of the day by his discoveries, was recognised by the learned in every country, and honours increased upon him with increasing years. He was corresponding member of the French Institute, perpetual secretary to the Royal Society of Sciences in Copenhagen, a knight of the Prussian Order of Merit, of the French Legion of Honour, and of the Danish Order of the Dannebrog, and a councillor of state. O.'s great object through life was to make science popular among all classes, in furtherance of which he wrote numerous

works, contributed scientific papers to the newspapers and magazines of his own country and Germany, and in addition to his regular prelections in the university, gave courses of popular scientific lectures to the public including ladies. Among the works specially written to promote the diffusion of scientific knowledge, those best known are *Aanden i Naturen* (Kop. 1845), and *Natur-leren's Mechaniske Deel* (Kop. 1847), both of which have been translated into several other European languages. The majority of his more important physical and chemical papers are contained in Poggendorff's *Annalen*, and were written by him in German or French, both of which he wrote with the same facility as his own language. At the close of 1850, a national jubilee was held in honour of the 50th anniversary of his connection with the university of Copenhagen—a festival which he did not long survive, as his death occurred at Copenhagen 9th March 1851. A public funeral, attended by all persons distinguished by rank or learning in the Danish capital, bore testimony to the respect and esteem with which he was regarded by his fellow-citizens, among whom his memory is cherished, not merely as one of the greatest scientific benefactors of his times, but as a man who contributed largely, by his eloquent and earnest advocacy of liberal principles, to the attainment of the high degree of constitutional freedom which Denmark now enjoys.

ŒSOPHAGUS (Gr. *oio*, to convey, and *phagein*, to eat), or GULLET, a membranous canal, about nine inches in length, extending from the pharynx to the stomach, and thus forming a part of the alimentary canal. It commences at the lower border of the cricoid cartilage of the larynx, descends in a nearly vertical direction along the front of the spine, passes through an opening in the diaphragm, and thus enters the abdomen, and terminates in the cardiac orifice of the stomach, opposite the ninth dorsal vertebra. It has three coats—viz., an external or muscular coat (consisting of two strata of fibres of considerable thickness—an external, longitudinal, and an internal, circular); an internal or mucous coat, which is covered with a thick layer of squamous epithelium; and an intermediate cellular coat, uniting the muscular and mucous coats. In this tissue are a large number of œsophageal glands, which open upon the surface by a long excretory duct, and are most numerous round the cardiac orifice, where they form a complete ring.

The œsophagus is liable to a considerable number of morbid changes, none of which are, however, of very common occurrence.

The most prominent symptom of *Œsophagitis*, or *Inflammation of the Œsophagus*, is pain between the shoulders, or behind the trachea or sternum, augmented in deglutition, which is usually more or less difficult, and sometimes impossible. The affection is regarded as a very rare one, unless when it originates from the direct application of irritating or very hot substances, or from mechanical violence—as, for instance, from the unskilful application of the stomach-pump or probang. Dr Coplaud, however, is of opinion that it is not unfrequent in children, particularly during infancy, and observes that 'when the milk is thrown up unchanged, we should always suspect the existence of inflammation of the œsophagus.' The ordinary treatment employed in inflammatory diseases must be adopted; and if inability to swallow exists, nourishing liquids, such as strong beef-tea, must be injected into the lower bowel.

Spasm of the Œsophagus—a morbid muscular contraction of the tube, producing more or less difficulty of swallowing—is a much more common affection than inflammation. The spasm generally comes on

suddenly during a meal. Upon an attempt to swallow, the food is arrested, and is either immediately rejected with considerable force, or is retained for a time, and then brought up by regurgitation; the former happening when the contraction takes place in the upper part of the canal, and the latter when it is near the lower part. In some cases, solids can be swallowed, while liquids excite spasm; while in other cases the opposite is observed; but in general either solids or liquids suffice to excite the contraction, when a predisposition to it exists. The predisposition usually consists in an excitable state of the nervous system, such as exists in hysteria, hypochondriasis, and generally in a debilitated condition of the body. An attack may consist of a single paroxysm, lasting only a few hours, or it may be more or less persistent for months or even years. The treatment must be directed to the establishment of the general health, by the administration of tonics and anti-spasmodics, by attention to the bowels and the various secretions, by exercise in the open air, the shower-bath, a nutritious diet, &c.; and by the avoidance of the excessive use of strong tea, coffee, and tobacco. Care must also be taken not to swallow anything imperfectly masticated or too hot; and the occasional passage of a bougie is recommended. Brodie relates a case that ceased spontaneously on the removal of bleeding piles. Strychnia is deserving of a trial when other means fail; and if the affection assume a decidedly periodic form, quinia will usually prove an effectual remedy.

Paralysis of the Esophagus is present in certain forms of organic disease of the brain or spinal cord, which are seldom amenable to treatment, and is often a very important part of the palsy that so frequently occurs in the most severe and chronic cases of insanity. In this affection there is inability to swallow, but no pain or other symptom of spasm; and a bougie may be passed without obstruction. The patient must be fed by the stomach-pump, and nutrient injections of strong beef-tea should be thrown into the lower bowel.

Permanent or Organic Stricture of the Esophagus may arise from inflammatory thickening and induration of its coats, or from scirrhus and other formations, situated either in the walls of or external to the tube. The most common seat of this affection is at its upper part. The symptoms are persistent and gradually increasing difficulty of swallowing, occasionally aggravated by fits of spasm; and a bougie, when passed, always meets with resistance at the same spot. When the contraction is due to inflammatory thickening, it may arise from the abuse of alcoholic drinks, or from swallowing boiling or corrosive fluids; and it is said that it has been induced by violent retching in sea-sickness. If unrelieved, the disease must prove fatal, either by ulceration of the tube around the seat of the stricture, or by sheer starvation. When the affection originates in inflammation, some advantage may be derived from a mild course of mercury, occasional leeching, and narcotics; and especially from the occasional passage of a bougie, of a ball-probang (an ivory ball attached to a piece of whalebone), or of a piece of sponge moistened with a weak solution of nitrate of silver. If it is dependent upon malignant disease, and the tissues have become softened by the infiltration of the morbid deposit, the bougie must be directed with the greatest care through the stricture, as a false passage may be easily made into important adjacent cavities.

Foreign bodies not very unfrequently pass into the esophagus, and become impacted there, giving rise to a sense of choking and fits of suffocative cough, especially when they are seated in its

upper part. They may not only cause immediate death by exciting spasm of the glottis, but if allowed to remain, may excite ulceration of the parts, and thus cause death by exhaustion. If the body is small and sharp (a fish-bone, for example), it may often be got rid of by making the patient swallow a large mouthful of bread; if it is large and soft (such as too large a mouthful of meat), it may generally be pushed down into the stomach with the probang; while large hard bodies (such as pieces of bone) should be brought up either by the action of an emetic, or by long curved forceps. If the offending body can neither be brought up nor pushed down, it must be extracted by the operation of *Esophagotomy*—an operation which can only be performed when the impacted body is not very low down, and which it is unnecessary to describe in these pages.

CESTRIDÆ, a family of dipterous insects, having a mere rudimentary proboscis or none, the palpi also sometimes wanting, and the mouth reduced to three tubercles; the antennæ short and enclosed in a cavity in the forepart of the head; the abdomen large. They are generally very hairy, the hair often coloured in rings. They resemble flesh-flies in their general appearance, and are nearly allied to *Muscidæ*. The perfect insect is very short-lived. The females deposit their eggs on different species of herbivorous mammalia, each insect being limited to a particular kind of quadruped, and selecting for its eggs a situation on the animal suitable to the habits of the larva, which are different in different species, although the larvae of all the species are parasites of herbivorous quadrupeds. The characters and habits of some of the most notable species are described in the article **BOT**. Animals seem generally to have a strong instinctive dread of the O. which infest them.

OFFENBACH, a manufacturing town of Hesse-Darmstadt, on the south bank of the river Main, within the domains of the Princes of Isenburg-Birstein, 4 miles south-east of Frankfurt. Pop. (1861) 16,685. O. is pleasantly situated in one of the richest parts of the valley of the Main, and is one of the most important manufacturing towns in the province. Among the industrial products, its carriages have acquired a pre-eminent character for excellence; and next to these, stand its book-bindings, articles of jewellery, gold and silver goods, carpets, and silk fabrics. It has also good manufactories of wax-cloth, papier-mâché snuff-boxes, tin-lacquered wares, umbrellas and parasols, wax-candles, leather, hats, tobacco, sugar, and gingerbread and spiced cakes. O. has several churches, and a Jewish synagogue. The palace is the winter residence of the Isenburg-Birstein family, to whom the old castle, now in ruins, also belongs. A pontoon-bridge across the river, and a railway to Frankfurt, facilitate intercommunication, and tend materially towards the maintenance of its active trade.

OFFENCES AGAINST RELIGION, PUBLIC PEACE, &c. See **RELIGION, PEACE, &c.**

OFFER AND ACCEPTANCE is one mode of entering into a contract of sale. At an auction, the highest offer is generally accepted as a matter of course; and when accepted, the contract is completed. An offer is often made by letter from one merchant to another to buy or sell goods. In such a case, the party offering is bound to wait until he gets an answer by return of post or messenger; for until then the offer is supposed to be continuously made. But if A offer to B personally to sell, and B ask time to consider for a day, or any given time, A is not bound to wait a single moment, according to

English law, and may withdraw at any time from the offer, because he had no legal consideration for waiting; whereas, in Scotland, in the same circumstances, A would be bound to wait the time agreed upon.

OFFERING. Under the head **FIRST-FRUTS** (q. v.) have been described the various offerings prescribed in the Jewish law. We shall have occasion to consider, under the head of **SACRIFICE** (q. v.), some further questions connected with the subject of offerings in public worship. In the Christian community there appears to have existed, from the earliest times, a practice of making voluntary offerings, for purposes not directly connected with public worship. See **OFFERTORY**.

OFFERTORY (Lat. *offertorium*, from *offero*, I offer) is the name given to that portion of the public liturgy of the Roman Catholic Church with which the eucharistic service, strictly so called, commences. In the Roman Liturgy it consists of one or two verses from some book of Scripture, generally from the Old Testament, but sometimes also from the Epistles. In the Ambrosian Liturgy it consists of a prayer, similar in form to the *collect* or *secret* of the mass; and in both, this recital is followed by the preparatory offering up of the bread and wine, accompanied by certain ceremonies and forms of prayer.

This offering of the bread and wine in the public service became, from a very early period, the occasion of a voluntary offering, on the part of the faithful; originally, it would seem, of the bread and wine designed for the eucharistic celebration and for the communion of the priest and the congregation, sometimes even including the absent members, and also for the *agape*, or common sacred feast, which accompanied it. That portion of the offerings which remained in excess of what was requisite for these purposes was applied to the relief of the poor, and to the support of the clergy. These offerings were ordinarily made by the faithful in person, and were laid upon the altar; and the Ambrosian rite still preserves this usage in a ceremonial which may be witnessed in the cathedral of Milan. By degrees, other gifts were superadded to those of bread and wine—as of corn, oil, wax, honey, eggs, butter, fruits, lambs, fowl, and other animals; and eventually of equivalents in money or other objects of value. The last-named class of offerings, however, was not so commonly made upon the altar and during the public liturgy, as in the form of free gifts presented on the occasion of other ministerial services, as of baptism, marriages, funerals, &c.; and from this has arisen the practice in the Roman Catholic Church of the mass-offering, or *honorarium*, which is given to a priest with the understanding that he shall offer the mass for the intention (whence the *honorarium* itself is often called an 'intention') of the offerent. In some places, however, and among them in some parts of Ireland, offerings 'in kind' are still in use, not indeed in the form of the ancient offertory, but in the shape of contributions of corn, hay, &c., at stated seasons, for the use of the parochial clergy. At weddings also, and in some places at funerals, offerings in money are made by the relations and friends of the newly married or of the deceased. In the Liturgy of the English Church allusion is made to the practice of oblations, and some of the recent controversies have turned upon the revival of the 'offertory,' which has found some advocates.

OFFICE, THE DIVINE (Lat. *officium*, duty), is the name popularly given to the **CANONICAL HOURS** (q. v.) prescribed to be read each day by bishops, priests, deacons, and sub-deacons in the Roman

Catholic Church. Under the head **BREVIARY** will be found a general description of the contents and the arrangement of that great service-book. The special portions assigned for any particular day constitute what is called the divine office for that day; and each person who is bound in virtue of his order to recite the Breviary, is obliged, under pain of sin, to read, not merely with the eye, but with distinct, although it may be silent, articulation, each and all these portions. The adjustment of the portions of the office of each day, the combination of the 'ordinary' portions which are read every day in common, with the parts 'proper' for each particular day, is a matter of considerable difficulty, and is regulated by a complicated system of **RUBRICS** (q. v.).

OFFICE, HOLY, CONGREGATION OF THE. In the article **INQUISITION** (q. v.) it has been explained that that tribunal is sometimes called by the name Holy Office. That title, however, properly belongs to the 'Congregation' at Rome, to which the direction of the Roman tribunal of the Inquisition is subject. This Congregation was established by Paul III. in 1542, and its organisation was completed by Sixtus V. It consists of twelve cardinals, a commissary, a number of 'theologians' and canonists who are styled 'consulters,' and of another class of officials called 'qualifiers,' whose duty it is to report on each case for the information of the cardinals. In the most solemn sessions of the Holy Office the pope himself presides in person. The action of the Holy Office, in addition to questions of heresy and crimes against faith, also extends to ecclesiastical offences, especially in connection with the administration of the sacraments.

OFFICE COPY is a copy made of a document by some officer of a court in whose custody the document is; and in general such copies are receivable in evidence, without further proof, in the same court, but not in other courts, except some statute makes them evidence.

OFFICERS, MILITARY AND NAVAL.—*Military Officers* are combatant and non-combatant, the latter term including paymasters, medical officers, commissariat, and other civil officers. The great divisions of rank are commissioned, warrant, and non-commissioned officers. Commissioned officers are those holding commissions from the crown, or a lord-lieutenant, and comprise all holding the rank of ensign, or corresponding or superior rank. Divided by duties, they are Staff Officers (see **STAFF**), or Regimental Officers (see **REGIMENT**); divided by rank, General Officers (q. v.), Field-Officers (q. v.), and troop or company officers. The last are captains, lieutenants, and cornets or ensigns, and, except in the cavalry, are unmounted. The different systems of promotion for officers, and especially the intricacies of the purchase system, will be explained under **PROMOTION, ARMY, and PURCHASE SYSTEM**. The only warrant officers in the army are Master-gunnery (see **GUNNER**) and Schoolmasters. Non-commissioned officers are described under that heading.

Officers, Naval, are commissioned, warrant, and petty officers. Commissioned officers are admirals, captains, commanders, lieutenants, and sub-lieutenants, described under their respective titles. Warrant Officers (q. v.) are boatswains, carpenters, gunners, and one class of engineers. Petty officers will be described under that heading, and constitute a very important portion of the management in a ship-of-war.

OFFICIAL ASSIGNEE, in English Law, is an officer of the Bankruptcy Court, in whom a

bankrupt's estate vests the moment an adjudication of bankruptcy is made. He is the manager of the property, and can sell the estate under the directions of the court in urgent cases, such as where the goods are perishable; but in general, he is assisted in the management by the creditors' assignees, who are selected from the body of creditors by the other creditors' votes. The official assignee is appointed by the Lord Chancellor, being selected from the body of merchants, brokers, or accountants. He is bound to find security to the extent of £6000. He is prohibited from carrying on trade on his own account. The salary is £1000.

OFFICIAL PLANTS (Lat. *officina*, a shop) are those medicinal plants which have a place in the pharmacopœias of different countries, and which are therefore sold—or some of their products or preparations of them—by apothecaries and druggists. The medicinal plants cultivated to any considerable extent are all official, but many are also official which are not cultivated. See **MEDICINAL PLANTS**.



Offset.

OFFSET, or **SET-OFF**, the splay or sloping part of a wall, &c., joining parallel surfaces when the upper face recedes from the lower. This frequently occurs on buttresses (see fig.). The O. is usually protected with dressed stones, having a projection or drip on the lower edge to prevent the rain from running down the wall.

OFFSETS, a term used by gardeners to designate the young bulbs, which springing from the axils of the scales of a bulb (q. v.), grow beside it, exhausting its strength, but which serve for the propagation of the plant. A crop of shallots, or of potato onions, consists entirely of the offsets of the bulbs planted in spring; although the term is not commonly used except as to bulbous-rooted plants prized for the beauty of their flowers.

OFFSETS. Let AEF....B....D....C be a field with very irregular sides; take the points A, O, M, C at or as near the corners as convenient, the object being to enclose as much of the field as possible within the quadrilateral AOMC; and for this

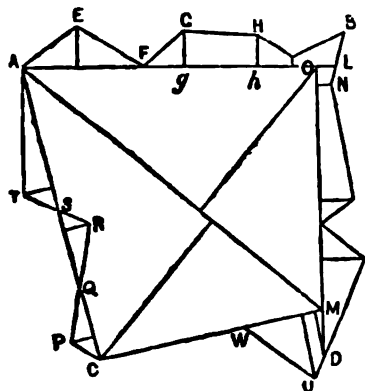


Fig. 1.

purpose it is sometimes necessary, as in the present case, to include a corner (as SRQ) which is outside the field. The area AOCD is found by means of the diagonal AM, and the perpendiculars on it from C and O. The area AEFG....BL is found

by dividing it into triangles and trapezoids by means of perpendiculars (to which the term *offsets* was originally applied, though it now denotes the irregular area before mentioned) from the corners E, G, H, &c. (see **TRIANGLE** and **TRAPEZOID**), and adding together the areas of the separate figures AEF, FGg, GHgh, &c. Similarly the areas of OLN....D and MDUW are found. To the sum of these must be added the areas of the triangles ATS, QPC, diminished by the area of SRQ, and the result is the whole area of the field. If the offset have no distinct corners, as (fig. 2) ABLMN....OK,

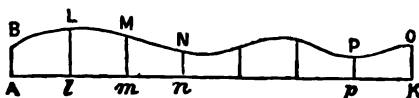


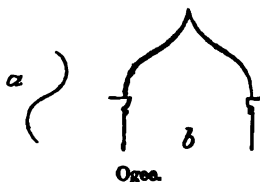
Fig. 2.

then the base AK is divided into equal parts by perpendiculars ABL, Mm, Nn, &c., and the area of the offset is found approximately as follows: the whole offset = ABL + LMm + MmNn + &c. + PpOK = $Al \times \frac{1}{2} (AB + Ll) + lm \times \frac{1}{2} (Ll + Mm) + mn \times \frac{1}{2} (Mm + Nn) + \dots + pK \times \frac{1}{2} (pP + OK) =$ (since the divisions of the base are equal) $Al \times \frac{1}{2} \{AB + 2Ll + 2Mm + 2Nn + \dots + 2pP + OK\} =$

$Al \times \left\{ \frac{AB + OK}{2} + Ll + Mm + Nn + \dots + Pp \right\}$; i. e., the area of an offset is found approximately by adding the intermediate perpendiculars to the semi-sum of the first and last, and multiplying the sum-total by the length of a division of the base, the divisions being equal; and the greater the number of perpendiculars, the nearer the result is to the true area.

O'GDENSBURG, a village and port of entry in New York, U. S., on the south bank of the river St Lawrence, at the mouth of the Oswegatchie, 210 miles north-west of Albany, and at the western terminus of the Northern Railway. It has a large lake and river trade, mills and factories, custom-house, town-hall, &c., and a steam-ferry to Prescott, Canada. Pop. in 1860, 7410.

OGEE, a moulding consisting of two curves, one concave and the other convex (a). It is called (in Classic Architecture) *Cymatium* or *Cyma Reversa* (see **MOULDING**). The ogee is also much used in Gothic architecture. An arch having each side formed with two contrasted curves is called an ogee arch (b). Figure a represents Hogarth's line of beauty.



O'GHAMS, the name given to the letters or signs of a secret alphabet long in use among the Irish and some other Celtic nations. Neither the origin nor the meaning of the name has been satisfactorily explained.

The alphabet itself is called *Bethuisia*, or *Bethuis*, from its first two letters, 'b' called 'beth' (birch), and 'l' called 'luis' (quicken). Its characters are lines, or groups of lines, deriving their significance from their position on a single stem or chief line—over, under, or through which they are drawn either straight or oblique. In some cases, the edge of the stone or other substance on which the Oghams are incised, serves the purpose of the stem or chief line. About eighty different forms of

OIL-REFINING—OILS.

much used for many purposes, as for making candles, toilet soaps, &c., and for lubricating machinery and the wheels of railway carriages. When fresh, it is eaten like butter. See OILS. The nut was formerly rejected as useless after the oil had been obtained from the fruit; but from its kernel a fixed oil is now extracted, called PALM-NUT OIL; which is clear and limpid, and has become to some extent an article of commerce. The O. P. abounds in mangrove swamps, but is also a conspicuous feature

Oil Palm.

(Copied from Livingstone's *Travels in Central Africa*.)

of the landscape on sandy coasts in the tropical parts of Western Africa. It yields from its trunk abundance of a pleasant and harmless beverage, which, however, becomes intoxicating in a few hours; called *Malova* in Angola, and much used there as an alcoholic stimulant. The unripe nuts of the O. P. are used in some parts of Africa for making an excellent kind of soup. The O. P. has been introduced into some parts of America, and is now abundant in them.

OIL-REFINING. Several oils, from the mode of their extraction, are necessarily impure, and various means are taken for refining or purifying them: thus, the so-called *fish-oils*—that is, whale, seal, cod, &c.—are clarified either by mixing them with a chemical solution, or by passing steam through them and filtering through coarse charcoal. The chemical solutions employed are various. One method is, to use a strong solution of oak bark, the tannic acid in which combines with the albuminous matters present in the oil, and precipitates them; another plan is, to agitate bleaching-powder, formed into a milk with water, with the oil; and then, after subsidence of the chloride of lime and water, to wash the oil with water, or jets of steam passed through it. A more simple and very effective plan, invented by Mr Dunn, is to apply a steam heat not exceeding 200° F., and then pass a current of air of the same temperature through it continuously for some time: this effectually bleaches the oil.

Olive, and some other vegetable oils, are refined by agitating them with a saturated solution of caustic soda. This renders the whole soapy; but after a time the oil precipitates a saponaceous deposit, and the remainder becomes quite clear and pure, and is then poured off. The value of several of the most important oils of commerce is so greatly increased by refining, that this art has now become a very important branch of business, and is carried out on a large scale.

OILS (including Fats). The fats and fixed oils constitute an important and well-marked group of organic compounds, which exist abundantly both in the animal and vegetable kingdoms. They are not simple organic compounds, but each of them is a mixture of several such compounds to which the term *glycerides* is applied; and the glycerides which by their mixture in various proportions form the numerous fats and oils are mainly those of palmitic, stearic, and oleic acids—if we adopt the recent view that Margarine Acid (q. v.) has no independent existence—and to a less extent those of other fatty acids, which will be presently noticed, such as butyric, caproic, caprylic, and capric acids, which are obtained from butter; myristic acid, which is obtained from cocoa-nut oil, &c. The members of this group may be solid and hard, like suet; semi-solid and soft, like butter and lard; or fluid, like the oils. The solid and semi-solid are, however, generally placed together and termed fats, in contradistinction to the fluid oils. The most solid fats are readily fusible, and become reduced to a fluid or oily state at a temperature lower than that of the boiling-point of water. They are not volatile, or, in other words, they cannot be distilled without decomposition, and it is not until a temperature of between 500° and 600° is reached that they begin nearly simultaneously to boil and to undergo decomposition, giving off acrolein (an acrid product of the distillation of glycerine) and other compounds. In consequence of this property, these oils are termed *fixed oils*, in contradistinction to a perfectly separate group of oily matters, on which the odoriferous properties of plants depend, and which, from their being able to bear distillation without change, are known as *volatile oils*. These, which are also known as *essential* or *etheral oils*, differ in toto in their chemical composition from the compounds we are now considering, and will be separately noticed in the latter part of this article. All the fats and oils are lighter than water, and are perfectly insoluble in that fluid. Their specific gravity ranges from about 0.91 to 0.94. They dissolve in ether, oil of turpentine (one of the volatile oils), benzol, and to a certain extent in alcohol; while, on the other hand, they act as solvents for sulphur, phosphorus, &c. If a fatty matter be shaken with a watery solution of albumen, gum, or some other substance that increases the density of the water, and renders it viscid, the mixture assumes a milky appearance, in consequence of the suspension of the fat or oil in the form of microscopic globules, and is termed an *emulsion*. These bodies possess the property of penetrating paper and other fabrics, rendering them transparent, and producing what is well known as a greasy stain. They are not readily inflammable unless with the agency of a wick, when they burn with a bright flame. In a pure and fresh state they are devoid of taste and smell, but on exposure to the air they become oxidised and acid, assume a deeper colour, evolve a disagreeable odour, and are acrid to the taste; or, in popular language, they become *rancid*. The rapidity with which this change occurs is considerably increased by the presence of mucilaginous or albuminous bodies. The rancidity may be removed by shaking the oil in hot water in which a little hydrated magnesia is suspended.

The general diffusion of fats and oils in the animal kingdom has been already described. (See FATS, ANIMAL.) In the vegetable kingdom they are equally widely distributed, there being scarcely any tissue of any plant in which traces of them may not be detected; but they are especially abundant in the seeds. The seeds of the *cruciferae* are remarkably rich in oil; linseed yielding fully 20 per cent., and

They vary in their specific gravity, but most of them are lighter than water, and refract light strongly. Most of them are nearly colourless when fresh, but darken on exposure to light and air; but a few are green, and two or three of a blue colour. By prolonged exposure they absorb oxygen, and become converted into resins.

By far the greater number of them are products of the vital activity of plants, in which most of them exist ready formed, being enclosed in minute cavities, which are often visible to the naked eye. Although diffused through almost every part of a plant, the oil is especially abundant in particular organs of certain families of plants. In the *Umbelliferae*, it is most abundant in the seeds; in the *Rosaceae*, in the petals of the flowers; in the *Myrtaceae* and *Labiatae*, in the leaves; in the *Aurantaceae*, in the rind of the fruit. As in the case of the animal and vegetable fats and fixed oils, so most of the essential oils occurring in plants are mixtures of two or more distinct chemical compounds, one of which usually contains no oxygen, while the others are oxidised. Of these, the former, which is a pure hydrocarbon, is the more volatile, and acts as a solvent for the others. Most of these oils, when cooled, separate into a solid and a fluid portion, to which the terms *Stearopten* and *Elæopten* have been applied.

In the comparatively few cases in which the oils are not formed naturally, they are produced by a species of fermentation, as in the case of Oil of Bitter Almonds and Oil of Mustard (q. v.), while others are the product of the dry distillation or of the putrefaction of many vegetable bodies. Some of the natural oils, as those of cinnamon, spiræa, and winter-green, have also been artificially produced.

The essential oils are much employed in the fabrication of Perfumery (q. v.), for the purpose of flavouring liqueurs, confectionary, &c., for various purposes in the arts (as in silvering mirrors), and in medicine. The special uses of the most important of these oils in medicine will be noticed subsequently.

The members of this group, which is an extremely numerous one (more than 140 essential oils being noticed in the article on that subject in *The English Cyclopædia*), admit of arrangement under four heads. 1. Pure Hydrocarbons; 2. Oxygenous Essential Oils; 3. Sulphurous Essential Oils; 4. Essential Oils obtained by Fermentation, Dry Distillation, &c.

1. The *Pure Hydrocarbons* are for the most part fluid, and have a lower specific gravity, a lower boiling point, and a higher refractive power than the oxygenous oils. They absorb oxygen, and are converted into oxygenous oils and resins. They may be separated from oxygenous oils, with which they are usually associated, by fractional distillation. They include oil of turpentine ($C_{10}H_{16}$), and the oils of bergamot, birch, chamomile, caraway, cloves, elemi, hop, juniper, lemons, orange, parsley, savine, and valerian, most or all of which contain the same hydrocarbon as Oil of Turpentine (q. v.), and in addition to it an oxidised compound; oil of copaiva ($C_{30}H_{44}$), attar of roses ($C_{15}H_{18}$), &c.

2. The *Oxygenous Essential Oils* may be either fluid or solid, the latter being also termed *Camphors*. A stearopten separates from most of the fluid oils on cooling. They are more soluble in water and spirit of wine than the pure hydrocarbons. They may be divided into (1.) those which are fluid at ordinary temperatures, such as those of aniseed, chamomile,* cajeput, caraway,* cinnamon, cloves,* fennel, lavender, peppermint, rue, spiræa, thyme,* winter-green, &c. Those marked with a (*) are associated with the pure hydrocarbons already

described. (2.) The camphors, such as ordinary camphor ($C_{15}H_{10}O_2$), Borneo camphor ($C_{15}H_{10}O_2$), &c.

3. The *Sulphurous Essential Oils* are chiefly obtained from the *Cruciferae*. They probably all contain the radical *allyl* (C_3H_5). The oils of garlic and of mustard (both of which have been described in special articles), and those of horse-radish, scurvy-grass, and asafetida, are the best illustrative of this division.

4. Amongst the essential oils obtained by fermentation, dry distillation, &c., may be mentioned the oils of bitter almonds and of black mustard, the oils of milfoil, plantain, centaury, &c. (whose leaves have no smell until they have been moistened for some time with water, when a kind of fermentation is set up, and oil is yielded in abundance), Furfuramide (q. v.), &c.

The British pharmacopœia contains the essential oils of anise, cajeput, caraway, chamomile, cinnamon, cloves, copaiva, coriander, cubeba, dill, juniper, lavender, lemon, nutmeg, peppermint, pimento, rosemary, rue, savine, spearmint, and turpentine. Of these, the oils of anise, cajeput, caraway, chamomile, coriander, dill, peppermint, pimento, and spearmint are used as stimulants and antispasmodics in cases of flatulence, griping, &c.; and to disguise the nauseous taste of various medicines. The oils of cajeput, cinnamon, and rue act similarly but more powerfully. The oils of copaiva and cubeba act in the same manner as the substances from which they are derived; oil of juniper is a powerful diuretic, and oil of savine (and to a less extent oil of rue) an emmenagogue. The oils of lavender and lemon are used to conceal the smell of sulphur ointment, and to give an agreeable odour to lotions, &c. The oil of rosemary is chiefly employed as a stimulating liniment, especially in cases of baldness; and the oil of nutmeg is seldom given medicinally except in the form of aromatic spirit of ammonia, into the composition of which it enters.

The length to which this article has been unavoidably extended, has precluded us from making any use of the admirable paper on the essential oils, which was recently (December 1863) read by Dr Gladstone to the Chemical Society.

Bland oils—such, for example, as olive oil—were much used by the ancients as external applications in various forms of disease. Celsus repeatedly speaks of the use of oil applied externally with friction in fevers, and in various other diseases. Pliny says that olive oil warms the body and at the same time cools the head, and that it was used with these objects previously to taking cold baths. Aretæus recommends a sitz-bath of oil in cases of renal calculi, and Josephus relates that a similar mode of treatment was employed in the case of Herod. Galen prescribed 'oil and wine' for wounds in the head; and the parable of the good Samaritan affords additional evidence that this was a common mode of treating wounds. The use of oil preparatory to athletic exercises is referred to by numerous Greek and Latin writers.

As a cosmetic—that is to say, as a means of giving to the skin and hair a smooth and graceful appearance—its use has been prevalent in hot climates from the earliest times. There is abundant historical evidence of this usage of oil amongst the Egyptians, the Jews, the Greeks, and the Romans; and Pliny's statement that butter is used by the negroes, and the lower class of Arabs, for the purpose of anointing, is confirmed by the observation of all recent African travellers. In hot climates, there is doubtless a practical as well as an æsthetic object in anointing. The oil, being a bad conductor of heat,

OILS.

affords a certain amount of protection against the direct action of the solar heat; it is likewise serviceable as a protection against the attacks of insects, and as a means of checking excessive perspiration. The fact of oily and fatty matters being bad conductors of heat, serves also to explain why the Esquimaux and other dwellers in Arctic regions have recourse to the inunction of the blubber, &c. In their case the oily investment serves to prevent the escape of the bodily heat.

The Greeks and Romans not only employed oil for the purposes already mentioned, but in their funeral rites; the bodies of their dead being anointed with oil, with the view probably of postponing incipient decomposition. A similar practice existed amongst the Jews, and in the Gospels we find various passages in which our Lord referred to his own body being anointed by anticipation. It appears from the evidence of S. Chrysostom, and other writers, that this ancient usage of anointing the bodies of the dead was long retained in the Christian Church. See UNCTION; EXTREME UNCTION.

In conclusion, we may remark that the ancient system of anointing, as a means of medical treatment, has to a certain extent been revived in modern times. Many physicians of the present day combine the inunction of cod-liver oil with its internal administration, a combination first recommended by Professor Simpson of Edinburgh; and Sir Henry Holland advocates the practice of anointing the harsh, dry skin of dyspeptic patients with warm oils. There can, we think, be little doubt that there are many forms of disease in which the local application of medicinal oils would prove advantageous; but the great drawback to their use is, that the time required for properly rubbing them into the skin is more than most patients are willing to concede. For much curious information on the subject of this article, the reader is referred to a very interesting paper by Mr Hunter, 'On the External Application of Oils,' in the second volume of *The Edinburgh Medical and Surgical Journal*.

OILS IN THEIR COMMERCIAL RELATIONS.—The solid animal oils found in commerce are butter and lard, tallow, mares' grease, goose grease, neats-foot oil, and unrefined yolk of egg oils. The two first are fully described under their names. See BUTTER, LARD. Tallow is the fat of oxen and sheep, but more especially the fat which envelops the kidneys and other parts of the viscera, rendered down or melted. The qualities of this solid oil render it particularly well adapted for making candles, and until the end of the first quarter of the present century, candles for ordinary use were almost wholly made of it, the high price of wax and spermaceti preventing their employment except by the most wealthy and for ecclesiastical purposes. Besides its use in making candles, tallow is most extensively used in the manufacture of soap, and for the purpose of preserving machinery from rust. The trade in tallow with Russia, which produces the largest quantity and the best, and with North and South America, and even with India and other countries, is very considerable; but it is declining, owing of course to the extension of gas and the enormous development of the paraffine and petroleum oils, and other light-giving materials. The quantities imported of late years into Britain were as follows:

		Total.
1st of June to 31st May	1839—1890,	94,825
	1870—1891,	117,982
	1881—1892,	101,122
	1893—1893,	78,579
	1893—1894 (to 13th February),	79,987

The chief use of tallow in this country is now in the manufacture of Soap (q. v.), and even in this it

has yielded in importance to palm and cocoa-nut oils.

Mares' Grease is not nearly so solid as tallow, it is a yellowish-brown grease, imported extensively from Monte Video and Buenos Ayres, where vast numbers of horses are slaughtered for their hides, bones, and grease; it is particularly valuable as a lubricant for machinery, and is chiefly employed for that purpose after much of its stearine has been removed for candle-making. The reason this material is called *mares'* grease, is said to be from the circumstance, that in South America horses are chiefly used, and mares are slaughtered as comparatively useless. Goose Grease is another soft fat, much valued by housewives for many purposes, but excepting that it is sold in some districts as a remedial agent, it has no commercial importance. Neats-foot Oil is a soft fat procured in the preparation of the feet and intestines of oxen for food as sold in the tripe-shops. The quantity obtained is not very great, but it is in much request by curriers for dressing leather. Yolk of Egg Oil is a hard oil, which, though little known in Britain, is extensively used in other countries where eggs are cheaper. In Russia, for instance, it is manufactured on so large a scale as to supply some of the largest makers of fancy soaps, and it forms the principal material in the celebrated Kazan Soap; and certain pomades are made of it which have a great reputation, and realise very high prices. This oil is not unlike palm oil in colour and consistency; but when refined is liquid, and has a reddish-yellow colour. Its price at Moscow is as high as 8s. per lb.

The liquid animal oils are more numerous, and, excepting tallow, are far more important, the so-called fish-oils being the principal. These are whale, porpoise, seal, cod, herring, shark, &c. The whales which are pursued for their oil are: (1.) The Sperm Whale. This huge creature is from 60 to 70 feet in length, and yields generally from 5000 to 6000 gallons of oil. The finest oil is taken from the great reservoir on the head. The oil of this species is all of a quality superior to others, and is known as sperm oil. For the method of procuring this oil, see CACHOLOZ. (2.) The Right Whale, which yields by far the largest proportion of whale oil. This, with that yielded by other less important species, is usually called train oil. The term *train* is supposed to be a corruption of *drain*, and applies to the circumstance of the oil being drained out of the blubber; and in this sense it is also applied to sperm oil from the blubber of the cacholot, in contradistinction to the finer oil from the head matter. The Right Whale forms the chief object of the northern fisheries, but other species of *Balaena* are pursued in different parts of the world for the sake of their oil. See WHALE.

Amongst the smaller Cetaceans, the porpoises, called also dolphins and grampuses, yield an excellent oil, second only in value to that of regular oil whales; and to obtain it, large numbers are occasionally killed in the British seas. The price of sperm oil ranges from £75 to £90 per tun, and that of ordinary train oil from £40 to £45 per tun of 252 gallons. The imports and consumption of the various kinds of whale oil for the last seven years are as follows:

	Imported.	Consumption.
	Tons.	Tons.
1886 to Jan. 1, 1887,	4596	4394
1888,	4281	5111
1889,	6556	5806
1891,	4550	5703
1891,	4761	4591
1892,	4548	3192
1893,	3648	3446

A large quantity of very valuable oil is obtained

from Seals, and the seal-fishery, as a means of obtaining oil, is only second in importance to that of the whale. It is carried on chiefly on the shores of Newfoundland, Greenland, and Labrador. Like the whales, the seals have a thick layer of blubber, in which the oil is contained. See SEAL. The first draining from the blubber is of a fine clear pale-straw colour; the next, yellow or tinged; and the last is brown or dark. The price ranges in our markets at about £48 to £50 per tun for pale, £42 to £45 for yellow, and £40 to £42 for brown. The whale and the seal oils are nearly all used for burning in lamps, and for this purpose they are admirably adapted by their great illuminating power. They are also the best lubricants for machinery.

Of the true fish oils, that from the cod is first in importance, more especially since its medicinal properties were discovered. It is made only from the liver of the fish; and the attempt which was made to induce a popular belief that the so-called cod-liver oil was different from the ordinary cod oil of commerce, was simply a cheat; no difference exists, and the oil is obtained just as good from the oil merchant, at a moderate price per gallon, as from the empiric at an exorbitant price per pint. Indeed, the purer the oil can be got, the better it is in a remedial point of view, notwithstanding the efforts made to convince the public that a certain colour is better than any other.

Instead of the old and somewhat rude methods of preparing the oil (see COD-LIVER OIL), much more complete and efficient arrangements are now adopted. The livers, when taken from the fish, are all examined, washed in clean water, and placed in sieves to dry. Thence they are transferred to pans heated with steam, and after being exposed to a gentle heat for about three-quarters of an hour, the heat is discontinued; and when cold, the oil which has separated is skimmed off, and strained through flannel bags into tubs. Here certain impurities subside, and the clear oil is poured off from the dregs, and the contents of numerous tubs are transferred to galvanised iron cisterns, in which a further settlement takes place. The oil is now ready for the filters, which are made of the strong cloth called moleskin, through which it is forced by atmospheric pressure into the store-tanks, which are also of galvanised iron. Hence it is pumped into the casks for export, which are usually hogsheads, tierces, and barrels. The value of cod-liver oil is about £50 to £55 per tun. The imports vary much according to the success of the fishery; they have reached nearly 1000 tons per annum. Besides its consumption in lamps, and for medicinal purposes, cod oil is used in making some kinds of soap. Oil is occasionally made from the herring, but not in very great quantities; it, however, forms a commercial article. It is made from the whole of the fish, the smell of which it retains to a very disagreeable extent.

The lightest of all the fixed oils is made from the liver of the common shark; it ranges from specific gravity 0.865 to 0.867. This, and the oil made from the livers of the Common Skate (*Raja batia*), the Thornback (*R. clavata*), and the White Skate (*Rhinobatus cerniculatus*), are often substituted for the cod-liver oil used medicinally, but have not its valuable properties.

Under the name of lard oil, large quantities of the oleine of lard have been imported of late years from America. It is a secondary product, arising from the great manufacture of lard stearine for candle-making which has arisen in that country. Lard oil is worth about £45 to £50 per tun, and is principally used as a lubricant for machinery.

The solid vegetable fixed oils which find a place

in commerce are palm oil, cocoa-nut oil, kokum or vegetable tallow, and carapa or carap oil. The palm oil is an oil of a bright orange-yellow colour and an agreeable violet odour, which is obtained from the not very thick covering of the hard seeds of the Oil-palm (q. v.). The fruits, when gathered, are shaken out of the clusters, and are laid in heaps in the sun for a short time, after which the natives boil them slowly in water, when the oil separates and is skimmed off the surface, and carried in small quantities to the depôts of the traders, who transfer it to casks which are prepared to receive it on board the ships. The quantity thus collected is enormous. The imports into Britain alone for the last five years have been as follows, in tons weight: 1859, 23,300; 1860, 31,000; 1861, 33,100; 1862, 38,828; 1863, 34,428. Previous to 1840, the chief use of palm oil was in making soap, but it was about that time found that the palmitine or fat acid of this oil was admirably adapted for the manufacture of Candles (q. v.); and since then it has become of much greater importance.

Cocoa-nut Oil is a white fat, with the peculiar smell of the kernel; it is made by grinding or pounding the kernel of the cocoa nut. After it has been boiled in water for a short time, the paste is submitted to great pressure, and a large quantity of milky juice is obtained; this is slowly boiled, and the oil separates and rises to the surface in considerable quantity, and is skimmed off. Twenty ordinary-sized nuts will yield as much as two quarts of oil. This oil is now very largely imported, and, treated in the same way as palm oil, forms a stearine, which greatly improves that of palm oil when mixed with it in proper proportions; neither does so well separately, and the consumption of cocoa-nut oil has consequently very greatly increased. Most of it comes from Ceylon, where the tree is largely cultivated on purpose. The imports in 1859 were 9600 tons; in 1861, 13,800 tons; and in 1863, 14,534 tons. By far the greater proportion of this vast quantity is used by the candle manufacturers, and the remainder in making common soap, its disagreeable smell preventing its being employed for the better kinds.

Vegetable Tallow, or Kokum Oil, is also used by the candle-makers; only small quantities, however, are imported. It comes from Singapore, and is produced from the seed of *Garcinia purpurea*, a species of the same genus with the mangosteen. Another kind of vegetable tallow is made in China, from the seeds of *Stillingia sebifera*.

Carapa, Carap, Crab, or Andiroba Oil, is very extensively made in British Guiana and the West Indies; but it is nearly all used there, either as a pomade for preserving the hair, or as an unguent for rheumatism and neuralgic pains, for which purposes it is said to be very useful. See CARAPA.

The Bassia Oil is beginning to attract attention, and several importations have taken place from India, and some rather large quantities have reached Liverpool from Bombay, under the name of Muohwa Oil. This oil is of a soft butter-like consistence, and yellowish-green colour, and is well adapted for soap-making and for machinery grease. See BASSIA.

The liquid vegetable oils are very numerous, and several are of great commercial importance. First in rank is Olive Oil, made from the ripe fruit of the Common Olive (*Olea Europea*). When good and fresh, it is of a pale greenish-yellow colour, with scarcely any smell or taste, except a sweetish nutty flavour, much esteemed by those who use it. The finest qualities are the Provence Oil (rarely seen in Britain), Florence Oil, and Lucca Oil. These are all used for salads and for cooking. The Genoa is used on the continent for the same purposes.

OILS.

and Galipoli, which is inferior, constitutes the great bulk of what is received in this country for cloth dressing, Turkey-red dyeing, and other purposes; the continental soap-makers also employ it extensively. The high price of the best qualities leads to much adulteration with poppy and other oils, but it is generally pretty safe when in the original tins as imported. The mode of obtaining the finest kinds is by gentle pressure of the fruit. The cake is afterwards treated with hot water, from the surface of which an inferior quality is skimmed. The Galipoli oil is obtained by allowing the olives to ferment in heaps, and then to press them in powerful oil-presses; the cake or marc is then treated with water once or twice, until all the oil is removed; this inferior oil is darker in colour, being a yellowish or brownish green. We receive the finest from Italy, and the commoner qualities from the Levant, Mogador, Spain, Portugal, and Sicily. The present values range from £52 to £58 for common kinds, and the finest Lucca is £1 the half chest, or nearly £85 per tun measure. The total quantity imported during the last four years was as follows: 1860, 21,800 tons; 1861, 16,500 tons; 1862, 19,062 tons; and in 1863, 19,299 tons.

Nearly all the other liquid vegetable oils of this class are obtained from seeds, and as they are most of them treated in the same way, one description will suffice. First, the seeds are ground—and this in Britain is always done by vertical stones (see Mill, fig. 4)—into a kind of coarse meal, which is then warmed in pans, and then put in certain portions in woollen cloths or bags, so arranged as to be of uniform thickness; these are again wrapped in horse-hair cloths, and each parcel is placed

a heavy wooden stamper, from 500 to 600 pounds weight, is raised by machinery about two feet, and allowed to fall upon the wedge *g*. This tightens all the other wedges and pressing-plates, and exerts a pressure of about 60 tons on each bag when fully driven home. The pressing-plates, *i*, *i*, *i*, *i*, are pierced with holes, and so are the plates *b*, *b*, *b*, *b*; and through these holes the oil trickles and passes away by the pipe, *k*, shown in fig. 2.

One of the chief seed oils is that of linseed (*q. v.*). Very little linseed oil is imported into Britain; the improved machinery, and the great demand for the oil-cake (see OIL-CAKE), cause it to be manufactured at home, and at present it is exported in considerable quantities; thus, from Hull alone there was exported in 1861, 16,180 tons weight; 1862, 14,200 tons; 1863, 9793 tons. The total production of Great Britain for the last six years has been as follows: 1858, 42,000 tons; 1859, 55,500 tons; 1860, 65,000 tons; 1861, 50,000 tons; 1862, 46,000 tons; and 1863, 42,000 tons weight; the remarkable decrease is attributed to over-speculation. It is worth about £36 per ton. Rape or Colza Oil is a name which covers the product of several cruciferous seeds, as rape, turnip, and other species of *Brassica*, radish, *Sinapis toria*, Gold of Pleasure, &c. The oil is clear brown and usually sweet, but with a mustard-like flavour; its illuminating powers are excellent, and it is also well adapted for wool-dressing. Very large quantities are made in Great Britain, chiefly from *Sinapis toria* and other Indian mustard seeds, which are imported under the name of Surzee Seed. The imports of these seeds are occasionally as much as 60,000 quarters per annum. Hemp Seed yields a green oil which is much used in making soft soap, especially in Holland. In Russia it is much eaten with various kinds of food, and is greatly liked by all classes.

The following are the names of a number of oils which are more or less used in this country: Cotton-seed Oil. Palm-nut Oil, a clear limpid oil from the hard nut of the oil-palm; this nut was formerly rejected as useless after the oil had been obtained from the fruit. Safflower-seed Oil, from the seeds of *Carthamus tinctorius*; it constitutes the real Macassar Oil. Sunflower-seed Oil, from seed imported from the Black Sea provinces of Russia; a rapidly increasing trade is springing up in this excellent oil. Poppy-seed Oil, from the seed of *Papaver somniferum*, largely imported from India; it is as sweet as olive oil, and is extensively substituted for it, especially in France, where it is also very largely cultivated. Gingelli-seed Oil, from the seed of *Sesamum orientale*, an important, Indian staple of which we are large consumers; the oil is much used for wool dressing, &c. Ground-nut Oil, from the seeds of *Arachis hypogaea*, imported from Western Africa and India; this oil is particularly adapted for fine machinery, as it is not affected by cold. Niger, Til, or Teel-seed Oil, from the seeds of *Guizotia oleifera*, much imported from Bombay. Croton Oil, from the seeds of *Jatropha curcas*, largely used in wool dressing. The Croton Oil used in medicine is from *Croton tiglium*, of which only small quantities are imported; whereas of the other 1200 or 1400 tons, besides a quantity of the seed, often reach us in one year. Another highly valuable medicinal oil, Castor Oil (*q. v.*), is of great commercial importance. Almond Oil, chiefly used for perfumery purposes, is made from the kernels of the sweet and bitter almond; it is the most free from flavour and odour of any oil in use, notwithstanding that the essential oil of bitter almonds is so strongly flavoured.

Oils made from the seeds of the following plants

Fig. 1.

between two flat boards slightly fluted on their inner sides, and then placed in the wedge-press (fig. 1). In this *a*, *a* are two flannel bags filled



Fig. 2.

wedge, *g*, is lastly inserted, and the press is ready for action. The operation is very simple;

have some commercial value in other countries: *Melia sativa*; *Argemone Mexicana*; various species of Jords; Garden Cress (*Lepidium sativum*); tobacco, now extensively used in Southern Russia, Turkey, and Austria; maize, rarely made in Vienna; hazelnuts; walnuts; nuts of stone pine; pistachio nut; tea-seed, this in China is a common painter's oil; the grape, from the seeds or stones, as they are called, saved from the wine-presses, used in Italy; Brazil-nuts (*Bertholletia excelsa*); *Calophyllum inophyllum*, called Pinnacottay Oil in India; *Melia azadirachta*, called in India by the names Neem and Margosa Oil; *Aleurites triloba*, called in India, Country Almond Oil, and much used for burning in lamps and torches; *Psoralea corylifolia*, called Baw-chee-seed Oil. The seed is sometimes imported to this country for pressing. Ben-seeds (*Moringa Pterygosperma*); Bonduc-nuts, the seeds of *Guilandina bonduc* and *G. bonducella*.

The following oils, new to European commerce, were shewn in the International Exhibition of 1862. India.—Teorah Oil, from the seeds of *Brassica erucastrum*; Capala Oil, from the seeds of *Rottlera tinctoria*; Cardamom Oil, from the seeds of *Elettaria Cardamomum*; Hidgee Badham Oil, from the seeds of *Anacardium occidentale*, or Cashew-nut, now largely cultivated in India; Cassia-seed Oil; Chaulmoogra Oil, from the seeds of *Hydnocarpus odorata*; Cheerongee Oil, from the seeds of *Buchanania latifolia*; Chemmarum Oil, from the seeds of *Amoora rohutaka*; Circassian-bean Oil, from the seeds of *Adenanthera pavonina*; Hoorhoorya Oil, from the seeds of *Polanisia icosandra*; Custard Apple-seed Oil, from the seeds of *Anona squamosa*; Exile Oil, from the seeds of *Cerbera Thevetia*; Monela-grain Oil, from the seeds of *Dolichos uniflorus*; Kanari Oil, from the seeds of *Canarium commune*; Khaliziri Oil, from the seeds of *Vernonia Anthelmintica*; Malkungunnee Oil, from the seeds of *Celastrus paniculatus*; Bakul Oil, from the seeds of *Mimusops elengi*; Rana Oil, from the seeds of *Mimusops Kaki*; Moodlooga or Pulas Oil, from the seeds of *Butea frondosa*; Nahor or Nageshur Oil, from the seeds of *Mesua ferox*; Hone-seed Oil, from seeds of *Calophyllum calaba*; Poonga, Caron, or Kurrmig Oil, from the seeds of *Pongamia glabra*; Vappanley Oil, from seeds of *Wrightia antilyssenterica*; Babool Oil, from seeds of *Acacia Arabica*; Gamboge Oil, from seeds of the Gamboge-tree (*Garcinia pictoria*); Coodiri Oil, from the seeds of *Sterculia foetida*; Kikool Oil, from the seed of *Salvadorea persica*; Marotty, Surrate, or Neeradi mootoo Oil, from the seeds of *Hydnocarpus inebrians*; and Pundi-kai Oil, from the nutmegs of *Myristica malabarica*.

From Brazil.—Oils from the seeds of *Feuillea cardifolia*, *F. monosperma*, *Anisiosperma passiflora*, *Cucurbita citrullus*, *Mabea fistuligera*, *Anda gomessi*, *Myristica bicuhiba*, *Carpotroche Brasiliensis*, *Dipteric odorata*, *Theobroma cacao*, *Acrocomia sclerocarpa*, *Nectandra cymbarum*, and from the fat of the Alligator and the Tapir, all for medicinal and perfumery purposes; and oils from the seeds of *Enocarpus Buciba*, (*E. pataud*), *Caryoca Brasiliensis*, and *Euterpe edulis*, used for culinary and lighting purposes.

From British Guiana.—Oil drawn from the stem of *Oreodaphne opifera*; it resembles refined turpentine, and is suggested as a solvent for india-rubber. Wallaba Oil, from the wood of the Wallaba-tree (*Eperera falcata*), medicinal.

The preparation of the essential oils is treated of in PERFUMERY.

The importance of the manufacture of oils is very great; in 1862 the value of the imports of the leading staples of this trade—viz., fish, palm, cocoa, and olive oils—was no less than £4,396,218. The

aggregate of the other kinds was a little over half a million. In addition, oil seeds to the value of £3,806,510 were imported for crushing in Great Britain; whilst the exports of oil amounted in value to £1,025,308. Thus, it will be seen that this industry represents a capital of nearly £10,000,000 sterling.

OIRIR-GAEL, a name which, in the early times of Scottish history, was applied to the Gaels of the coasts, in contradistinction from the Gall-Gael or Islesmen. There was long a struggle for superiority between these two races, represented respectively by Somerled of the Isles and the later kings of Man, in which the latter were eventually successful, uniting under one head the dominion of Argyle and the Isles.

OISE, a river of France, one of the chief affluents of the Seine, rises in the vicinity of Rocroy, in the north of the department of Ardennes, and flows south-west, joining the Seine at Conflans-Sainte-Honorine, after a course of 150 miles, for the last 75 of which it is navigable. The fall of the river is very gradual, and its course is extremely sinuous. It is connected by canals with the Somme, the Sambre, and the Scheldt, and forms one of the chief commercial routes between Belgium and Paris. It becomes navigable at Chaunty.

OISE, a department in the north of France, is bounded on the E. by the department of Aisne, and on the W. chiefly by that of Seine-Inférieure, which intervenes between it and the English Channel. Area, 1,446,869 English acres, of which 950,000 acres are in arable land; pop. (1862) 401,417. The principal rivers are the Oise—from which the department derives its name—and its tributaries the Aube and Therain. The department is almost wholly included in the basin of the Oise; and as the course of that river indicates, the surface—consisting for the most part of extensive plains—has a general slope toward the south-west. The soil is in general fertile, and agriculture is well advanced. The products are the usual grain-crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. The department is divided into the four arrondissements of Beauvais, Clermont, Compiègne, Senlis; capital, Beauvais.

OITI (*Moquilea tomentosa*), a tree of the natural order *Chrysobalanaceæ*—by many botanists regarded as a suborder of *Rosaceæ* (q. v.)—a native of the north of Brazil, and valuable on account of its timber, which is very good for ship-building.

O'KA, an important commercial river of Central Russia, the principal affluent of the Volga from the south, rises in the government of Orel, and flows in a generally north-east direction, forming a common boundary between the governments of Tula, Kaluga, and Moscow; and afterwards flowing through the governments of Riazan, Vladimir, and Nijni-Novgorod. It joins the Volga at the city of Nijni-Novgorod, after a course of 837 miles. Its basin, estimated at 127,000 square miles in extent, comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Belev, or Bielev, Kaluga, Riazan, and Murom; the most important affluents are the rivers Moscow, Kliasma, and Tzna. During spring, the Oka is navigable from Orel to the Volga; but in summer the navigation is obstructed by sandbanks. It communicates with the ports on the Baltic, Caspian, and White Seas; and the cargoes annually shipped down the river amount in value to several million pounds sterling.

O-KEE-CHO-BEE, a lake bordering on the Everglades of Southern Florida (see FLORIDA), about 120 miles in circuit, receiving several small rivers,

and having for its outlet the river Caloo-sa-hatchee, which flows westerly into the Gulf of Mexico.

OKEN (originally OCKENFUSS), LORENZ, a celebrated German naturalist, was born at Bohlshach, in Würtemberg, August 1, 1779. He studied at Würzburg and Göttingen; became extra-ordinary professor of medicine at Jena in 1807, where his lectures on natural philosophy, natural history, zoology, comparative anatomy, vegetable and animal physiology, attracted much notice. In 1812, he was appointed ordinary professor of natural science; and in 1816, commenced the publication of a journal partly scientific and partly political, called *Iris*, which continued to appear till 1848. The opinions promulgated in the *Iris* led to government interference, and O. resigned his chair, and became a private tutor, devoting his leisure to the composition of works on natural history. In 1828, he obtained a professorship in the newly-established university of Munich; but in 1832, exchanged it for another at Zürich, where he died, 11th August 1851. O. aimed at constructing all knowledge *a priori*, and thus setting forth the system of nature in its universal relations. The two principal works in which this idea is developed are his *Lehrbuch der Naturphilosophie* (Jena, 1808—1811), and his *Lehrbuch der Naturgeschichte* (3 vols. Leip. 1813—1827). The former has been translated into English, and published by the Ray Society under the title of *Elements of Physio-philosophy*. As O.'s philosophic system of nature was very peculiar, and quite unlike anything that had preceded it, O. invented a nomenclature of his own, which, however, in many cases is forced and pretentious, composed for the most part of new-coined words, and difficult to remember. It therefore found little favour, and O. was long regarded—particularly by French and English savans—as a mere dreamer and transcendental theorist; nor can it be denied that he is largely such, infected with the worst vices of the school of Schelling, to which he belonged; but some of his 'intuitions'—if we may so term his scientific suggestions—were remarkably felicitous, and in the hands of rigorous demonstrators, have led to great results. In his work *Die Zeugung* (On Generation, Bamb. 1805), he first suggested that all animals are built of vesicles or cells; in his *Beiträge zur vergleichenden Zoologie, Anatomie und Physiologie* (1806), he pointed out the origin of the intestines in the umbilical vesicle; and in the same year lighted accidentally upon the idea, since so prolific of results, that the bones of the skull are modified vertebra. On account of this discovery, he has been termed 'the father of morphological science.' That O., and not Gütbe, was the original discoverer of the vertebral relations of the skull, has been conclusively shewn by Owen, in a valuable notice of O. in the *Encyclopædia Britannica*.

OKHOTSK, SEA OF, an extensive inlet of the North Pacific Ocean, on the east coast of Russian Siberia. It is bounded on the N. by the wastes of Siberia, on the E. by the peninsula of Kamchatka, and is partially enclosed by the Kurile Islands on the S. and by the island of Saghalien on the W. It is 1000 miles in length, and 500 miles in breadth. The river Ud, which enters it on the north, is 400 miles in length. Owing to climate and position, the Sea of O. is unlikely ever to become the scene of much commerce. On its northern shore, at the mouth of the Okhota—from which it derives its name—is the small seaport of Okhotsk, lat. 57° 21' N., long. 143° 17' E. This town has only 236 inhabitants, and has been entirely superseded by the ports of Ayan and Nikolayevsk.

OLAF, the Saint, one of the most revered of the early Norwegian kings, was born in 995; and after

having distinguished himself by his gallant exploits, and made his name a terror in several warlike expeditions on the coasts of Normandy and England, succeeded, in 1016, in wresting the throne of Norway from Eric and Svend Jarl. The cruel severity with which he endeavoured to exterminate paganism by fire and sword, alienated the affection of his subjects, many of whom sought security from his persecution in the territories of Knut or Canute the Great, king of Denmark; and it was only through the powerful aid of his brother-in-law, the Swedish Anund Jacob, that his authority could be upheld. O.'s hot-headed zeal, however, after a time exhausted the patience of the people, who hastened to tender their allegiance to Knut, on his landing in Norway in 1028, when O. fled to the court of his brother-in-law, Jaroslav of Russia, who gave him a band of 4000 men, at the head of whom he returned, in 1030, and gave Knut battle at Stiklestad, where O. was defeated by the aid of his own subjects, and slain. The body of the king, which had been left on the field of battle, and buried on the spot by a peasant, having begun to work miracles, his remains were carefully removed to the cathedral of Trondhjem, where the fame of their miraculous power spread far and wide, attracting pilgrims from all parts of the Scandinavian peninsula. O. was solemnly proclaimed patron saint of Norway, in the succeeding century; and from that period till the Reformation, he continued to gather round him a rich heritage of mythical legends and popular sagas, the memory of which still lingers in the folk-lore of Norway. In 1847, the order of Olaf was created, in honour of the Saint, by King Oscar I. of Sweden and Norway.

OLBERS, HEINRICH WILHELM MATHIAS, a celebrated German physician and astronomer, was born at Arbergen, a small village of Bremen, October 11, 1758. He studied medicine at Göttingen from 1777 till 1780, and subsequently commenced to practise at Bremen, where, both as a physician and as a man, he was highly esteemed by his fellow-citizens. In 1811, he was a successful competitor for the prize proposed by Napoleon for the best 'Mémorial on the Croup.' O. has written little on medical subjects, for, from 1779, all the leisure time which he could abstract from professional occupations was devoted to the enthusiastic study of astronomy. The first thing which brought him into notice, was his calculation of the orbit of the comet of 1779, which was performed by him while watching by the bedside of a sick patient, and was found to be very accurate. Comets were the chief objects of his investigation, and he seems to have been seized with an irresistible predilection for these vagabonds of the solar system, which his two important discoveries of the planets Pallas (1802) and Vesta (1807) could not diminish. In 1781, he had the honour of first re-discovering the planet Uranus, which had previously been supposed, even by Herschel himself, to be a comet, and which had been sought for in vain. He also discovered five comets, in 1798, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815 (hence called *Olbers' comet*), had been some days previously observed at Paris. His observations, calculations, and notices of various comets, which are of inestimable value to astronomers, were published in the *Annuaire of Bode* (1782—1829), in the *Annuaire of Encke* (1833), and in three collections by the Baron de Zach. Most of these calculations were made after a new method, discovered by himself, for determining the orbit of a comet from three observations; a method which, for facility and accuracy, he considered as greatly preferable to those then in use. A detail of it appeared in a journal published at Weimar (1797), and a new edition by Encke in 1847. O. was one of that small band of astronomers

which included also Schröter, Gauss, Piazzi, Bode, Harding, &c., who in the first ten years of the 19th c. devoted their energies to the observation of those planets which were coming to light between Mars and Jupiter. As above stated, two of them, the second and fourth in order of discovery, were detected by O. himself; and the general equality of the elements of the four planetoids, led him to propound the well-known theory, that these, and the other planetoids (q.v.) since discovered, are but fragments of some large planet which formerly revolved round the sun at a distance equal to the mean of the distances of the planetoids from the same luminary. It was this theory which led him, after the discovery of Pallas, to seek for more fragments of the supposed planet, a search resulting in the discovery of Vesta. O. also made some important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. O. died at Bremen, 2d March 1840; and in 1850, his fellow-citizens erected a marble statue in honour of him. O., as a writer, possessed great powers of thought, combined with equal clearness and elegance of expression. The dissertations with which he enriched the various branches of astronomy are scattered through various collections, journals, and other periodicals.

OLD POINT COMFORT, a village and watering-place in Virginia, U. S., at the entrance of Hampton Roads, and James River, 12 miles from Norfolk, and the site of Fortress Monroe, the largest military work in the United States.

OLD RED SANDSTONE, the name given to a large series of Palaeozoic rocks, of which red sandstones are the most conspicuous portions, but which contains also white, yellow, or green sandstones, as well as beds of clay and limestone. The group lies below the Carboniferous strata, and was called 'Old' to distinguish it from a newer series of similar beds which occur above the Coal Measures. The discovery that the highly fossiliferous calcareous rocks of Devonshire and the continent occupied the same geological horizon, shewed that the name was very far from being descriptive of all the deposits of the period, and suggested to Murchison and Sedgwick the desirableness of giving them a new designation. They consequently proposed Devonian, which has been extensively adopted; but it is liable to the same objection as that urged against the name it was intended to supplant, inasmuch as it incorrectly limits geographically what the other limits lithologically. Many names used by geologists are similarly at fault; there is therefore no good reason why the old name should be given up, especially as it has been rendered classical by the labours and writings of Hugh Miller, the original monographer of these rocks.

The position of the O. R. S. series is easily determined, though the sequence of the various beds which form it is somewhat obscure. All the rocks are situated between the beds of the Silurian and Carboniferous periods. In Wales, Scotland, and Ireland it has been observed that there is an old series of red sandstones which are more or less conformable with the underlying Silurians, and a newer series unconformable with the older strata, but conformable with the overlying Carboniferous rocks. The great interval represented by this break has been believed to be that during which the Calcareous Devonian rocks were deposited. The recent researches, however, of Mr Salter shew that the one set of beds do not alternate with the other, but that they are really contemporaneous—the coarse shallow water deposits of conglomerate and

sandstone having been formed on the shores of that sea in whose depths the deposits of thicker mass, finer grain, and lighter colour, full of marine shells and corals, were at the same time being aggregated.

The strata of the period have been arranged in four groups. 1. Upper Old Red Sandstone, including the Marwood and Petherwin groups. 2. Middle Old Red Sandstone, including the Dartmouth and Plymouth groups. 3. Lower Old Red Sandstone, including the North Foreland and Torbay groups. 4. Tilestones or Ledbury Shales.

1. The Upper Old Red Sandstones are conformable with the inferior strata of the Coal Measures, and differ so little petrologically, or even palaeontologically from them, that they have been considered as the basement series of that period. They consist of yellowish and light-coloured sandstones, which are at Dura Den, in Fifeshire, remarkably rich in some of their layers in the remains of *Holoptychius*, *Pterichthys*, *Dendrodus*, &c. In the south of Ireland, and at Dunse, similar beds contain a fresh-water shell very like the modern *Anodon*, and fragments of a fern called *Cyclopteris Hibernica*. Mr Salter has shewn, from the intercalation of the marine beds with the red sandstone, and from the identity of the fossils, that the Devonian representatives of these beds are the Marwood and Petherwin groups. These consist of dark-coloured calcareous and argillaceous beds, and gray and reddish sandstones. The fossils found in them are shells and land-plants, many of them belonging to the same genera, but different species to those which are found in the Carboniferous system. The little crustacean *Cypridina* and *Clymenia* are so characteristic of this division, that in Germany the strata are known as the *Cypridinien Schiefer* and *Clymenien Kalk*.

2. The Middle Old Red Sandstone is represented in the north of Scotland by the Caithness flags, a series of dark-gray bituminous schists, slightly micaceous or calcareous, and remarkably tough and durable. Throughout their whole thickness they are charged with fossil fish and obscure vegetable remains. The characteristic fishes belong to the genera *Coccosteus*, *Asterolepis*, and *Dipterus*. The corresponding beds in Devonshire are the Dartmouth and Plymouth groups, which consist of extensive deposits of limestones and schists, all of them abounding in the remains of corals, trilobites, and shells. In the German equivalent, the Eifel Limestone, but especially in the Russian, the characteristic invertebrate fossils of the Devonshire calcareous beds have been found associated with the remains of *Coccosteus*, shewing beyond doubt the identity of these various beds. The *Calceola Schiefer* of German geologists belongs to the Middle Old Red; it receives its name from the abundance in it of a singular brachiopod (*Calceola sandalina*).

3. The Lower Old Red Sandstone consists of strata of red shale and sandstone, with beds of impure arenaceous limestone (cornstone), and frequently at the base great deposits of red conglomerate. The fossils peculiar to this division are the remarkable fish *Cephalaspis*, and the huge crustacea of the genus *Pterygotus*, besides a few shells. To the south of the Grampians, the strata consist of a gray paving-stone and coarse roofing-slate. The Devonian representatives of this section are the sandstones and slates of the North Foreland, Linton, and Torbay, and the series of slaty beds and quartz ore sandstones developed on the banks of the Rhine near Coblenz. The *Cephalaspis*, so characteristic of the cornstones, has been found in the Rhenish beds.

4. The Tilestones or Ledbury Shales consist of finely laminated reddish and green micaceous

its picturesque beauty—Keller, Uklei, and Gross-Eutin; while in regard to climate, soil, and natural products, it participates in the general physical characteristics of Holstein. The chief town is Eutin (pop. 4000), pleasantly situated on the lake of the same name, with a fine castle surrounded by a magnificent park.

The principality of Birkenfeld, lying south-west of the Rhine, among the Hundrück Mountains, and between Rhenish Prussia and Lichtenberg, is an outlying territory, situated in lat. $49^{\circ} 30' - 49^{\circ} 52' N.$, and in long. $7^{\circ} - 7^{\circ} 30' E.$ Its area is 192 square miles, and its pop. 34,391. The soil of Birkenfeld is not generally productive; but in the lower and more sheltered valleys, it yields wheat, flax, and hemp. Wood is abundant. The mineral products, which are of considerable importance, comprise iron, copper, lead, coal, and building-stone; while in addition to the rearing of cattle, sheep, and swine, the polishing of stones, more especially agates, constitutes the principal source of industry. The principality is divided into three governmental districts.

O. is a constitutional ducal monarchy, hereditary in the male line of the reigning family. The constitution, which is based upon that of 1849, revised in 1852, is common to the three provinces, which are represented in one joint chamber, composed of 47 members, chosen by free voters. Each principality has, however, its special provincial council, the members of which are likewise elected by votes; while each governmental district within the provinces has its local board of councillors, and its several courts of law, police, finance, &c.; although the highest judicial court of appeal, and the ecclesiastical and ministerial offices, are located at Oldenburg.

Perfect liberty of conscience was guaranteed by the constitution of 1849. The Lutheran is the predominant church, upwards of 200,000 of the population belonging to that denomination; while about 70,000 persons profess the Roman Catholic religion.

There are two gymnasia, one higher provincial college, several secondary, and 547 elementary schools; but in consequence of the scarcity of villages in the duchy, and the isolated position of many of the houses of the peasantry, schools are not common in the country districts, and the standard of education of the lower classes is, from these causes, scarcely equal to that existing in other parts of Northern Germany. The military forces of O. number 4007 men; while the federal contingent amounts to 2986 men, who are incorporated in one brigade with the troops of the three Hanseatic cities. O. has a separate vote in the *Plenum* of the federal diet, and a joint vote with Anhalt and Schwarzburg in the limited council.

History.—The territory now included in the grand-duchy of O. was in ancient times occupied by the Teutonic race of the Chauci, who were subsequently merged with the more generally known Frisii, or Frisians; and the land, under the names of Ammergau and Leringau, was for a long period included among the dominions of the Dukes of Saxony. In 1180, the Counts of O. and Delmenhorst succeeded in establishing independent states from the territories of Henry the Lion, which fell into a condition of disorganisation after his downfall.

This family has continued to rule O. to the present day, giving, moreover, new dynasties to the kingdom of Denmark, the empire of Russia, and the kingdom of Sweden. See OLDENBURG, HOUSE OF. On the death, in 1667, of Count Anthony Gunther, the wisest and best of the O. rulers, his dominions, in default of nearer heirs, fell to the

Danish reigning family, and continued for a century to be ruled by viceroys nominated by the kings of Denmark. This union was, however, severed in 1773, when, by a family compact, Christian VII. made over his O. territories to the Grand Duke Paul of Russia, who represented the Holstein-Gottorp branch of the family. Paul having renounced the joint countships of Delmenhorst and O. in favour of his cousin, Frederick Augustus, of the younger or Kiel line, of the House of O., who was Prince-bishop of Lübeck, the emperor raised the united O. territories to the rank of a duchy. The present reigning family is descended from Duke Peter Friedrich Ludwig, cousin to the Prince-bishop, Frederick Augustus. For a time, the duke was a member of Napoleon's Rhenish Confederation; but French troops having, in spite of this bond of alliance, taken forcible possession of the duchy in 1811, and incorporated it with the French empire, the ejected prince joined the ranks of the allies. In recognition of this adhesion, the Congress of Vienna transferred certain portions of territory, with 5000 Hanoverians and 20,000 inhabitants of the quondam French district of the Saar, to the O. allegiance. From these new acquisitions were organised the district Amme, and the principality of Birkenfeld; while O. was raised to the dignity of a grand-duchy. The revolutionary movement of 1848 was quite as productive of violent and compulsory political changes in this as in other German states; and in 1849, after having existed for centuries without even a show of constitutional or legislative freedom, it entered suddenly into possession of the most extreme of liberal constitutions. The reaction in favour of absolutism, which the licence and want of purpose of the popular party naturally induced all over Germany, led in 1852 to a revision and modification of the constitution, which, however, in its present form contains the essential principles of popular liberty and security. Still, it must be confessed this is more verbal than real; and hitherto, under the assumption that the people have not yet acquired the necessary amount of political intelligence for the judicious use of national independence, the grand-dukes, with the co-operation of the contented bureaucracy who fill the chambers, have relieved the people of the labour and responsibility of sharing largely in the affairs of government.

OLDENBURG, capital of the grand-duchy of the same name, is pleasantly situated on the banks of the navigable river Hunte, 25 miles west-north-west of Bremen. Pop. 9000. O. is the seat of the administrative departments, and the focus of the literary, scientific, and commercial activity of the duchy. It has a normal school, a military academy, a public library of 80,000 vols., a picture-gallery, museum, &c. The grand-ducal palace is worthy of note for its fine gardens, its valuable pictures, and other art collections, and its library. The principal church is St Lambert's, containing the burying-vaults of the reigning family. O. is the seat of an active river-trade, and is noted for its excellent studs, and the great cattle and horse fairs which are annually held here in the months of June and August.

OLDENBURG, THE HOUSE OF, which lays just claim to being one of the oldest reigning families of Europe, has been rendered still more illustrious by various matrimonial alliances, which, in the course of ages, have successively been the means of creating new royal dynasties. Thus, for instance, in 1418, a scion of this House being elected king of Denmark, under the title of Christian I., became the progenitor of the Danish House of Oldenburg, the imperial

House of Russia, the late royal family of Sweden, and the collateral and junior Danish lines of Augustenburg, Kiel, and Sonderburg-Glücksburg. Christian owed his election to the recommendation of his maternal uncle, Duke Adolph of Slesvig, who, when the throne was offered to him on the sudden death of King Christopher, refused, on the ground of age, and proposed Christian of Oldenburg, who, as the direct descendant of Eric Glipping's daughter, Princess Richissa, was allied to the old extinct House of Denmark. The death, in 1459, of Adolph, Duke of Slesvig and Count of Holstein, without male heirs, opened the question of succession to those states, which has since become one of such variations import. The ancient law of Denmark recognised hereditary fiefs only in exceptional cases; crown fiefs being generally held for life or merely for a time *ad gratiam*. Such being the case, Slesvig might, on the death of Adolph, have been taken by the crown as a lapsed tenure; but Holstein, being held under the empire, would have been separated from it. Adolph and his subjects were alike anxious that Slesvig and Holstein should continue united; but although the Slesvig estates, at the wish of the Duke Adolph, had recognised Christian as successor to the duchy before his accession to the throne of Denmark, the Holstein Chambers were divided on the question of succession, the majority shewing a preference for the claims of the counts of Schauenburg, who were descended from male agnates of the Holstein House. Christian, in his eagerness to secure both states, was willing to sacrifice his rights in Slesvig to his schemes in regard to Holstein; and having bought over the Holstein nobles by bribes and fair promises, he was elected Duke of Slesvig and Count of Holstein at Ribe in 1460, where he signed a deed, alike derogatory to the interests and unworthy the dignity of his crown. In this compact, by which he bartered away the just prerogatives and independence of himself and his successors, for the sake of nominal present gain, he pledged his word for himself and his heirs, that the two provinces should always remain undivided, '*exig biblen toosamende ungedeel*,' and not be dismembered by division or heritage. This document, which remained for ages unknown or forgotten, was discovered by the historian Dahlmann amid the neglected papers of the Holstein state archives at Preetz, and proclaimed in 1848 by that ardent admirer of Germany as the unchangeable fundamental law of the Slesvig-Holstein provinces. The confusion, dissension, and ill-will to which this fatal deed has given rise, are the fruits which Christian's unscrupulous desire to secure power at any cost has produced for his descendants, whose complicated claims on the duchies are at the present moment devastating the Danish kingdom with an exterminating war. From Christian I. descend two distinct branches of the Oldenburg line: 1. The royal dynasty, extinct in the male line in Frederick VII., late king of Denmark, and the collateral branches of Sonderburg-Augustenburg, and Sonderburg-Glücksburg; 2. The ducal Holstein-Gottorp line, descended from Duke Adolph, who died in 1586, and was the second son of King Frederick I. This prince had received, during his father's lifetime, a portion of the Slesvig and Holstein lands, which he was permitted, on the accession of his elder brother, Christian III., to retain for himself and his heirs. This line became illustrious by the marriage of Prince Karl Friedrich, the son of Hedwig-Sofia, eldest sister of Charles XII. of Sweden (a direct descendant of Duke Adolph) with the Grand-duchess Anna, daughter of Peter the Great, and thus gave to Russia the dynasty which still occupies the imperial throne; while Adolph-Friedrich,

a cousin of Prince Karl Friedrich, by his election to the throne of Sweden in 1751, added another crown to those already held by the House of Oldenburg. The conduct of his descendants rendered the new dignity short-lived, for with the abdication of Gustavus IV., in 1809, the Holstein-Gottorp dynasty became extinct in Sweden.

The complicated relations of the House of O. in regard to the Danish succession, after giving rise to much angry discussion among the princes interested in the question, and the Danish people themselves, led the great powers to enter into a treaty, known as the London Treaty of 1852, for settling the question of succession, on the ground that the integrity of the Danish monarchy was intimately connected with the maintenance of the balance of power and the cause of peace in Europe. England, France, Austria, Prussia, Russia, Sweden, and Denmark, were parties to this treaty, in the first article of which it was provided, that on the extinction of the male line of the royal House, Prince Christian of Slesvig-Holstein-Sonderburg-Glücksburg, and his male heirs, according to the order of primogeniture, should succeed to all the dominions, then united under the sway of the king of Denmark. The rights of succession, which rested with the Augustenburg family, were forfeited by a compact which the Duke of Augustenburg entered into for the surrender of his claims, in consideration of a sum of money paid to him by Denmark. The duke's morganatic marriage, and his subsequent rebellion, in 1848, against the Danish king, were the causes which led to the arrangement of this family compact on the existing terms. This treaty, known as the London Protocol of May 1852, was followed in October of the same year by the publication of a supplementary clause, which stipulated, that on the extinction of the heirs-male of Prince Christian of Slesvig-Holstein-Sonderburg-Glücksburg, the Holstein-Gottorp, or imperial Russian line should succeed to the Danish dominions. This article, even more than the original clauses of the treaty, met with the strongest opposition among the Danes, and after being twice rejected in the Landsting, the London Treaty was only ratified after a new election of members, and on the assurance of the king that in excluding all female cognate lines from the succession, there was no definite intention of advancing the claims of Russia. King Frederick's death, in 1863, has brought the crisis of the much-vexed question of the Danish succession; and although the London Treaty has been so far followed that Prince Christian has succeeded as king of Denmark, the evils that were anticipated from the measure are at this moment (April 1864) being made manifest; for the Duke of Augustenburg, notwithstanding the renunciation by his family of all claims to the succession, has appealed to the federal diet for the recognition of his rights on Holstein; and the German powers, glad of a pretext to extend their influence beyond the Eider, are occupying the Slesvig-Holstein (q. v.) territory, and endeavouring, by force of superior numbers, to advance the boundary of Germany to the borders of Jutland, or perhaps even to its northernmost extremity; and thus make a new division of the old Danish heritage of the House of O., which, if it be effected in accordance with the plans of the diet, will bring about the total dismemberment of Denmark.

OLDHAM, a parliamentary borough and flourishing manufacturing town of England, in the county of Lancashire, stands on the Medlock, six miles north-east of Manchester. It owes its rapid increase in population and in wealth to the extensive coal-mines in the vicinity, and to its cotton

manufactures, which have increased remarkably within late years. It is not only the great centre of the hat-manufacture, but is also celebrated for its manufactures of fustians, velveteens, cords, cotton, woollen, and silk goods. Numerous silk-mills, brass and iron foundries, machine-shops, tanneries, rope-works, &c., are in operation. The parish church, the town-hall, the Blue-coat and the Grammar-schools, are the chief edifices. Pop. in 1851 of municipal borough, 52,820; 1861, of municipal borough, 72,333, of parliamentary borough, (which returns two members to the House of Commons), 94,344.

OLDHAMIA, a genus of fossil zoophytes, dedicated by Forbes to Professor Oldham, who was their discoverer. Only two species are known, but they are of peculiar interest, because, with their associated worm-tracks and burrows, they are the first distinct evidence of life on the globe. They exist as mere tracings on the surface of the laminae of metamorphosed shales, all remains of the substance of the organism having entirely disappeared. The form of the hard polypidom is preserved, and shews a jointed main stem, giving off at each joint, in the one species, a circle of simple rays, and in the other a fan-shaped group. Forbes pointed out their affinities in some respects to the Hydrozoa, and in others to the Polyzoa. Kinahan, who described the genus at some length, considers them to have been Hydrozoa allied to Sertularia; while Huxley places them among the Polyzoa.

OLDYS, WILLIAM, a most erudite and industrious bibliographer, was a natural son of Dr William Oldys, Chancellor of Lincoln, and advocate of the Admiralty Court, and was born in 1687. Regarding his early life, little is known. His father dying in 1708, left him a small property, which O. squandered as soon as he got it into his own hands. The most of his life was spent as a bookseller's hack. He drank hard; and was so scandalously fond of low company, that he preferred to live within the 'rules' of the Fleet Prison to any more respectable place. As may easily be supposed from his habits, the dissolute old bookworm was often in extremely necessitous circumstances, and when he died (April 15, 1761), he left hardly enough to decently bury him. It is but fair to add that O. had some sterling merits. Captain Grose, who knew him, praises his good-nature, honour, and integrity as a historian, and says that 'nothing would ever have biassed him to insert any fact in his writings which he did not believe, or to suppress any he did.' For about ten years, O. acted as librarian to the Earl of Oxford, whose valuable collection of books and MSS. he arranged and catalogued. His chief works are *The British Librarian, exhibiting a Compendious Review of all Unpublished and Valuable Books in all Sciences* (London, 1737, anonymously); *a Life of Sir Walter Raleigh*, prefixed to Raleigh's *History of the World* (1738); a translation of Camden's *Britannia* (2 vols.); *The Harleian Miscellany, or a Collection of Scarce, Curious, and Entertaining Tracts* (8 vols. Lond. 1753). Besides these, O. wrote a great variety of miscellaneous literary and bibliographical 'articles' for his friends the booksellers, which it would be tedious to mention.

OLEACEÆ, a natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves, and flowers in racemes or panicles. The calyx is in one piece, divided, persistent; the corolla is hypogynous, generally 4-cleft, sometimes of four petals, sometimes wanting; there are generally two, rarely four stamens; the ovary is free, 2-celled, the cells 2-seeded; the fruit is a drupe, a capsule, or a samara (see these heads); the cotyledons are

foliaceous. Nearly 150 species are known, mostly natives of temperate countries. Among them are the olive, ash, lilac, privet, phillyrea, fringe tree, &c. Between some of these there is a great dissimilarity, so that this order is apt to be regarded as a very heterogeneous group; but the real affinity of the species composing it is manifested by the fact, that even those which seem most unlike can be grafted one upon another, as the lilac or the olive on the ash. Bitter, astringent, and tonic properties are prevalent in this order.

OLEANDER (*Nerium*), a genus of plants of the natural order *Apocynaceæ*, having a 5-parted calyx, set round on the inside at the base with many tooth-like points or glands, a salver-shaped 5-cleft corolla, in the throat of which is a 5-parted and toothed or lacerated corona, five stamens, the anthers adhering to the stigma, the fruit composed of two follicles. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The common O. (*N. oleander*), a native of the south of Europe, the north of Africa, and many of the warmer temperate parts of Asia, is frequently planted in many countries as an ornamental shrub, and is not uncommon in Britain as a window-plant. It has beautiful red, or sometimes white, flowers. The English call it *ROSE BAY*, and the French *ROSE LAUREL* (*Laurier Rose*). It attains a height of eight or ten feet. Its flowers give a splendid appearance to many ruins in the south of Italy. It delights in moist situations, and is often found near streams. All parts of it contain a bitter and narcotic-acrid juice, poisonous to men and cattle, which flows out as a white milk when young twigs are broken off. Cases of poisoning have occurred by children eating its flowers, and even by the use of the wood for spits or skewers in roasting meat. Its exhalations are injurious to those who remain long under their influence, particularly to those who sleep under it. A decoction of the leaves or bark is much used in the south of France as a wash to cure cutaneous maladies.—*N. odoratum*, an Indian species, has larger flowers, which are very fragrant.—*N. picidium* (or *Eschaltum picidium*), a perennial climber, a native of the Kasya Hills, has a very fibrous bark, the fibre of which is used in India as hemp. The steeping of the stems in ponds kills fish.

OLEASTER. See **ELÆAGNUS**.

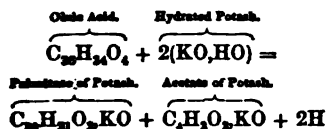
OLEFIANT GAS (C_4H_4) is transparent and colourless, possesses a disagreeable alliaceous odour, and acts as a poison when breathed. Its specific gravity is 0.981. It takes fire when brought in contact with a flame, and burns with a bright clear light. When this gas is mixed with oxygen or atmospheric air in the proportion of 1 volume with 3 volumes of oxygen, or with 15 volumes of atmospheric air, it forms a powerfully explosive mixture. It is more soluble in cold than in hot water—100 volumes of water at 32° absorbing 26.5 volumes of the gas, while at 68° they only absorb 14 volumes. It was liquefied by Faraday, under great pressure, but remained unfrozen at -166° . If it be conducted through strongly-heated tubes, or if a continuous series of electric sparks be passed through it, it is decomposed into a very dense black carbon, and double its own volume of hydrogen; and if it is subjected to a less intense heat, the products of decomposition are carbon and light carburetted hydrogen or marsh gas (C_2H_4). Chlorine acts upon this gas in a very remarkable manner. When the two gases are mixed in equal volumes, they combine to form a heavy oily liquid, to which the term chloride of olefiant gas, or Dutch Liquid (q. v.), is

given. It is from this reaction that the term *olefant* was originally applied to this gas.

Olefant gas is a constituent of the gaseous explosive admixtures that accumulate in coal-pits, and of the gaseous products yielded by the distillation of wood, resinous matters, and coal; and the brightness of the flame of ordinary gas is in a great measure dependent upon the quantity of olefant gas that is present.

This gas is most readily obtained by the action of oil of vitriol on alcohol; the reactions that ensue are too complicated to be described in these pages.

OLEIC ACID ($C_{18}H_{32}O_2$), at temperatures above 57° , exists as a colourless limpid fluid, of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colours. At 40° , it solidifies into a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid, it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. It is not a volatile acid, and on the application of a strong heat, it breaks up into several substances, such as caproic, caprylic, and sebacic acids—the last-named being the most characteristic product of the distillation. If oleic acid be exposed to the action of hyponitric acid (NO_2), it is converted into an isomeric, solid, fatty acid, termed *elaidic acid*. A very small quantity of hyponitric acid (1 part to 200 of oleic acid) is sufficient to effect this remarkable change, the nature of which is unknown. When distilled with moderately strong nitric acid, it is oxidised into a large number of products, including all the volatile fatty acids represented by the formula $C_nH_{2n}O_2$, from formic acid (HCO_2H) to capric acid ($C_{10}H_{20}O_2$), with six fixed elaidic acids of the formula $C_nH_{2n-2}O_2$, viz., succinic acid, lipoic acid, adipic acid, pimelic acid, suberic acid, and anchoic (or leparglyic) acid. When heated with hydrated potash, it breaks up into palmitic and acetic acids, as shewn in the equation:



These decompositions and disintegrations seem to illustrate the facility with which, by the mere process of oxidation, which is perpetually at work in living structures, one organic acid can be converted into others.

Oleic acid is a constituent of *Oleine* (q. v.), which exists in most of the fats and fatty oils of the animal and vegetable kingdoms, and most abundantly in the liquid fats or oils, and hence its name is derived. It is very difficult to obtain the acid in a state of purity, in consequence of the readiness with which it oxidises; and we shall not enter into details regarding the method of its preparation. It is obtained in a crude form, as a secondary product, in the manufacture of stearine candles; but almond oil is generally employed when the pure acid is required.

Oleic acid forms normal (or neutral) and acid salts; but the only compounds of this class that require notice are the normal salts of the alkalis. These are all soluble, and by the evaporation of their aqueous solution, form *soaps*. Oleate of potash forms a soft soap, which is the chief ingredient in Naples soap; while oleate of soda is a hard soap, which enters largely into the composition of Marseille soap.

The oleates of the alkalis occur in the animal body, in the blood, chyle, lymph, and bile; they

have also been found in pus, in pulmonary tubercles, and in the excrements, after the administration of purgatives.

OLEINE ($C_{11}H_{19}O_2$) is proved, by the researches of Berthelot, to be a triglyceride of oleic acid. See GLYCERINE. Pure oleine is a colourless and inodorous oil, which solidifies into acicular crystals at about 23° , is insoluble in water, and only slightly soluble in cold alcohol, but dissolves in ether in all proportions. By exposure to the air, it darkens in colour, becomes acid and rancid (from the gradual decomposition of the oleic acid), and finally assumes a resinoid appearance. Hyponitric acid converts it into an isomeric, white, solid fat, named *elaidine*—the glyceride of the elaidic acid described in the preceding article.

Pure oleine is obtained by cooling olive oil to 32° , which occasions the separation of the stearine and palmitine in a solid form. The fluid portion is then dissolved in alcohol, which, on being cooled to 32° , deposits in a solid form everything but oleine, which is obtained in a pure state by driving off by heat, the alcohol from the decanted or filtered solution.

The drying oils, such as those of linseed, hemp, walnut, poppy, &c., contain a variety of oleine, which is not converted into elaidine by the action of hyponitric acid, or of subnitrate of mercury, which, when prepared without the aid of heat, contains enough of the acid to produce a similar effect. Hence, these substances may be used to detect fraudulent adulterations of olive or almond oil with poppy and other cheap drying oils.

OLEO'METER, or ELAIOMETER, an instrument for ascertaining the densities of fixed oils. It consists of a very delicate thermometer-tube, the bulb being large in proportion to the stem. It is divided into fifty degrees, and floats at zero in pure oil of poppy-seed, at 38° to $38\frac{1}{2}^\circ$ in pure oil of almonds, and at 50° in pure olive oil.

OLEOPHOSPHORIC ACID is a yellow viscid substance, which is insoluble in water and cold alcohol, but dissolves readily in boiling alcohol and in ether. When boiled for a long time with water or with alcohol, or when treated with an acid, it resolves itself into oleine and phosphoric acid; while alkalis decompose it into phosphoric acid, oleates, and glycerine. It exists, according to Frémy and other chemists, in the brain, spinal cord, kidneys, and liver.

OLÉRON, ISLE OF (anc. *Uliarus*), an island of France, forming a portion of the department of Charente-Inférieure, lies off the west coast of France, opposite the mouth of the river Charente. It is 19 miles long, and about 5 miles broad, and is unusually fertile, producing abundantly all the crops grown in the department to which it belongs. See CHARENTE-INFÉRIEURE. At its northern extremity, is the light-house of Chassiron. In the seaport of Oléron, distilleries, rope-walks, and ship-building yards are in operation. The town of Sainte-Pierre-d'Oléron (pop. 1556) stands near the centre of the island. The pop. of the island is given at 16,000.

OLÉRON, LAWS OF, or JUGEMENTS D'OLÉRON, a celebrated code of maritime law compiled in France in the reign of St Louis, and so named from a groundless story, that it was enacted by Richard I. of England during the time that his expedition to Palestine lay at anchor at that island. The real origin of these laws was a written code, called *Il Consolato del Mare*, of about the middle of the 13th c., compiled either at Barcelona or at Pisa, forming the established usages of Venice and the other Mediterranean states, and acceded to by the kings of France and counts of Provence. Besides containing regulations simply mercantile, this system

defied the mutual rights of belligerent and neutral vessels, as they have been since understood in modern international law. The so-called laws of Oléron were a code of regulations borrowed from the *Consolato*, which for several centuries were adopted as the basis of their maritime law by all the nations of Europe. Copies of the *Jugements d'Oléron* are appended to some ancient editions of the *Coutumier de Normandie*. See NORMANDY, CUSTOMARY LAW OF.

OLGA, St., a saint of the Russian Church, wife of the Duke Igor of Kiev, who, having undertaken an expedition against Constantinople, which proved unsuccessful, was slain on his return to his own dominions. His widow O. avenged his death, assumed the government in his stead, and for many years governed with much prudence and success. Having resigned the government to her son Vratislaf about the year 952, she repaired to Constantinople, where she was baptized, by the patriarch Theophilaktos, and received into the church, assuming at baptism the name of Helena, in honour of St Helena, mother of Constantine. She returned to Russia, and laboured with much zeal for the propagation of her new creed; but she failed in her attempt to induce her son, Swântoslav, to embrace Christianity. Her grandson, Vladimir, having married Chrysoberga, the sister of the emperors of Constantinople, Basil and Constantine, was baptized in the year 988; but his grandmother did not live to enjoy this gratification, having died in 978, or, according to other authorities, as early as 970. She is held in high veneration in the Russian Church. Her festival is held on July 21, and the practice of venerating her appears to date from the early period of the Russian Church, before the schism between the Eastern and Western churches.

OLIBANUM, a gum-resin, which flows from incisions made in *Boswellia serrata*, a tree found in some parts of the East. See BOSWELLIA. It is the *Lebanon* of the Hebrews, *Libanos* or *Libanotos* of the Greeks, *Thus* of the Romans, of all which terms the ordinary English translation is *Frankincense* (q. v.). It occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverised; and diffuses a strong aromatic odour when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is chiefly employed for fumigation, and is used as incense in Roman Catholic churches. It is sometimes distinctively called *Indian O.*; a similar substance, in smaller tears, called *African O.*, being produced by *Boswellia papyrifera*, a tree found growing on bare limestone rocks in the east of Abyssinia, and sending its roots to a great depth into the crevices of the rock. The middle layers of the bark are of fine texture, and are used instead of paper for writing.

OLIFANT'S RIVER. Two considerable streams of this name are found in the Cape Colony. The Olifant's River West rises in the Winterhoek Mountains, and enters the Atlantic in lat. 31° 40', after a course of 150 miles, and a basin of drainage of 25,000 square miles.—The Olifant's River East drains a great part of the district of George, and joins the Gauritz River 60 miles above the entrance of that river into the sea. Its course is upwards of 150 miles in length, and it is more available for irrigation than almost any other Cape river.

O'LIGARCHY (*oligos*, few, and *archo*, to govern), a term applied by Greek political writers to that perversion of an aristocracy in which the rule of the

dominant part of the community ceases to be the exponent of the general interests of the state, owing to the cessation of those substantial grounds of pre-eminence in which an aristocracy originated. The governing power in these circumstances becomes a faction, whose efforts are chiefly devoted to their own aggrandisement and the extension of their power and privileges.

OLINDA, a suburb of the Brazilian city of Pernambuco (q. v.).

OLIPHANT, MRS MARGARET (née WILSON), one of the most distinguished of our living female novelists, was born about the year 1820. The prevalent impression that she is a Scotchwoman, naturally enough derived from the obvious fondness with which in her earlier works she has treated Scottish character and incident, is not strictly correct. She is a native of Liverpool; her mother was, however, a Scotchwoman of a somewhat remarkable type, strongly attached to old traditions. In 1849, Mrs O. published her first work, *Passages in the Life of Mrs Margaret Maitland of Sunnyside*, which instantly won attention and approval. Its most distinctive charm is the tender humour and insight which regulate its exquisite delineation of Scottish life and character at once in their higher and lower levels. This work was followed by *Merkland* (1851); *Adam Graeme of Mosgray* (1852); *Harry Muir* (1853); *Magdalen Hepburn* (1854); *Lilliesleaf* (1855); and subsequently by *Zaidee*, *Katie Stewart*, and *The Quiet Heart*, which originally appeared in succession in *Blackwood's Magazine*. Though these are of somewhat various merit, in all of them the peculiar talent of the writer is marked. They are rich in the minute detail which is dear to the womanly mind; have nice and subtle insights into character, a flavour of quiet humour, and frequent traits of delicacy and pathos in the treatment of the gentler emotions. It is, however, on the *Chronicles of Carlingford* that her reputation as a novelist most securely rests. In the first of the two sections separately published, apart from its other merits, which are great, the character of little Netty, the heroine, vivifies the whole work, and may rank as an original creation. The other, *Salem Chapel*, perhaps indicates a wider and more vigorous grasp than is to be found in any other work of the authoress. Certain of the unlovelier features of English dissent, as exhibited in a small provincial community, are here graphically sketched, and adapted with admirable skill to the purposes of fiction. The intrusion, however, in some portion of the work of a 'sensational' element, as it is termed, though it subserves intensity of interest, must be noted as a little defective in art, the tragic material coalescing throughout but indifferently with the circle of homelier fact, in which the story for the most part moves. In addition to her novels, this accomplished lady has, in her *Life of Edward Irving*, published in 1862, made a most valuable contribution to biographical literature.

OLIVAREZ, DON GASPARO DE GUZMAN, COUNT OF, Duke of San Lucar, and prime-minister of Philip IV. of Spain, was born on January 6, 1587, at Rome, where his father was ambassador. He belonged to a distinguished but impoverished family, received a learned education, became the friend of Philip IV., his confidant in his amours, and afterwards his prime-minister, in which capacity he exercised almost unlimited power for twenty-two years. O. shewed ability for government, but his constant endeavour was to wring money from the country that he might carry on wars. His oppressive measures caused insurrections in Catalonia and

OLIVE—OLIVES.

Andalusia, and roused the Portuguese to shake off the Spanish yoke in 1640, and make the Duke of Braganza their king, an event which O. reported to Philip with satisfaction, as it enabled him to confiscate the duke's great estates in Spain. But the arms of Spain being unsuccessful, the king was obliged to dismiss the minister in 1643. He would probably have been recalled to the head of affairs, but for a publication in which he gave offence to many persons of influence. He was ordered to retire to Toro, and confine himself to that place, where he died, 12th July 1645. (Céspedes, *Hist. De Felipe IV.*)

OLIVE (*Olea*), a genus of trees and shrubs of the natural order *Oleaceae*; having opposite, evergreen, leathery leaves, which are generally entire, smooth, and minutely scaly; small flowers in compound axillary racemes, or in thyrses at the end of the twigs; a small 4-toothed calyx, a 4-cleft corolla, two stamens, a 2-cleft stigma; the fruit a drupe. The species are widely distributed in the warmer temperate parts of the globe. The COMMON O. (*O. Europaea*), a native of Syria and other Asiatic countries, and perhaps also of the south of Europe, although probably it is there rather naturalised than indigenous, is in its wild state a thorny shrub

in various ways, being usually first steeped in lime-water, by which they are rendered softer and milder in taste. They are well known as a restorative of the palate, and are also said to promote digestion. Disagreeable as they generally are at first, they are soon greatly relieved, and in the south of Europe are even a considerable article of food. Dried olives are there also used, as well as pickled olives.—The wood of the olive-tree takes a beautiful polish, and has black cloudy spots and veins on a greenish-yellow ground; it is principally used for the finest purposes by cabinet-makers and turners. The wood of the root is marked in a peculiarly beautiful manner, and is used for making snuff-boxes and small ornamental articles. The bark of the tree is bitter and astringent; and both it and the leaves have febrifuge properties. A gum resin exudes from old stems, which much resembles storax, has an odour like vanilla, and is used in all parts of Italy for perfumery.—Among the Greeks, the O. was sacred to Pallas Athene (Minerva), who was honoured as the bestower of it; it was also the emblem of chastity. A crown of olive-twig was the highest distinction of a citizen who had merited well of his country, and the highest prize of the victor in the Olympic games. An olive branch was also the symbol of peace (compare Gen. viii. 11); and the vanquished, who came to supplicate for peace, bore olive-branches in their hands.—The O. has been cultivated in Syria, Palestine, and other parts of the east, from the earliest times. Its cultivation extends southwards as far as Cairo, and northwards to the middle of France. It is very generally propagated by suckers, but where great care is bestowed on it, inarching is practised. It grows from cuttings. The climate of England is too cold for the O., yet in Devonshire it ripens its fruit on a south wall.—*Olea similis* and several other species are useful trees of South Africa, yielding a very hard and extremely durable wood. Some of them bear the name of IRONWOOD at the Cape of Good Hope. The AMERICAN O. (*O. Americana*) is also remarkable for the hardness of its wood. It is found as far north as Virginia. It is a tree of 30—35 feet high, with much broader leaves than the Common Olive. Its fruit is fit for use. Its flowers are fragrant. The FRAGRANT O. (*O. fragrans*, or *Oemanthus fragrans*) of China and Japan has extremely fragrant flowers, which are used by the Chinese for flavouring tea.

Common Olive (*Olea Europaea*):

a, fruit reduced; b, flower; c, flower with corolla and stamens removed to show the pistil.

a small tree, but through cultivation becomes a tree of 20—40 feet high, destitute of spines. It attains a prodigious age. The cultivated varieties are very numerous, differing in the breadth of the leaves, and in other characters. The leaves resemble those of a willow, are lanceolate, entire, of a dull dark-green colour above, scaly and whitish-gray beneath; the flowers small and white, in short dense racemes; the fruit greenish, whitish, violet, or even black, never larger than a pigeon's egg, generally oval, sometimes globular, or obovate, or acuminate. The fruit is produced in vast profusion, so that an old olive-tree becomes very valuable to its owner. It is chiefly from the pericarp that olive oil is obtained, not from the seed, contrary to the general rule of the vegetable kingdom. Olive oil is much used as an article of food in the countries in which it is produced, and to a smaller extent in other countries, to which it is exported also for medicinal and other uses (see OILS). Olives, gathered before they are quite ripe, are pickled

O'LIVENITE, a mineral, consisting chiefly of arsenic acid and protoxide of copper, with a little phosphoric acid and a little water. It is generally of some dark shade of green, sometimes brown or yellow. It is found along with different ores of copper in Cornwall and elsewhere. It is often crystallised in oblique four-sided prisms, of which the extremities are acutely bevelled, and the obtuse lateral edges sometimes truncated, or in acute double four-sided pyramids; it is sometimes also spherical, kidney-shaped, columnar, or fibrous.

OLIVES, MOUNT OF, called also **MOUNT OLIVET**, an inconsiderable ridge lying on the east side of Jerusalem, from which it is only separated by the narrow Valley of Jehosaphat. It is called by the modern Arabs Jebel-el-Tur, and takes its familiar name from a magnificent grove of olive-trees which once stood on its western flank, but has now in great part disappeared. The road to Mount Olivet is through St Stephen's Gate, and leads by a stone bridge over the now almost waterless brook Cedron. Immediately beyond, at the foot of the bridge, lies the Garden of Gethsemane; and the road here parts into two branches, northwards towards Galilee, and eastwards to Jericho. The

ridge rises in three peaks, the central one of which is 2556 feet above the level of the sea, and 416 feet above the Valley of Jehosaphat. The southern summit is now called 'the Mount of Offence,' and was the scene of the idolatrous worship established by Solomon for his foreign wives and concubines. The northern peak is the supposed scene of the appearance of the angels to the disciples after the resurrection, and is remarkable in Jewish history as the place in which Titus formed his encampment in the expedition against the fated city of Jerusalem. But it is around the central peak, which is the Mount of O. properly so called, that all the most sacred associations of Christian history converge. On the summit stands the Church of the Ascension, built originally by St Helen, the modern church being now in the hands of the Armenian community; and near it are shewn the various places where, according to tradition, our Lord wept over Jerusalem, where the apostles composed the apostles' creed, where our Lord taught them the Lord's Prayer, &c. Near the Church of the Ascension is a mosque and the tomb of a Mohammedan saint. In the Garden of Gethsemane, at the foot of the hill, is shewn the scene of our Lord's agony. The northern peak spreads out into a plain of considerable extent, which is painfully notable in Jewish history as the place where, after the Jews on occasion of the revolt under Bar-Kochbah, were debarred by Adrian from entering Jerusalem, they were wont to assemble annually on the anniversary of the burning of the Temple to celebrate this mournful anniversary, and to take a distant look at their beloved Jerusalem. The scene is beautifully described, and with much dramatic feeling, by St Jerome.—*Com. in Sophoniam*, t. iii. p. 1665.

OLIVETANS, a religious order of the Roman Catholic Church, one of the many remarkable products of that well-known spiritual movement which characterised the 12th and 13th centuries. The O., or Brethren of Our Lady of Mount Olivet, are an offshoot of the great Benedictine Order (q. v.), and derive their origin from John Tolomei, a native of Siena, born in the year 1272. Tolomei had been a distinguished professor of philosophy in the university of his native city; but his career was suddenly interrupted by the loss of his sight. Although he was cured of his blindness (and, as he himself believed, miraculously), this visitation convinced him of the vanity of earthly things; and in company with some friends he withdrew to a solitary place near Siena, where he devoted himself to prayer and religious exercises. By the direction of the pope, John XXII., the new brethren adopted the Benedictine rule; but they chose as their especial province the cultivation of sacred science, and the duty of teaching. In the year 1319, Tolomei was chosen as the first general; and even in his lifetime the institute made rapid progress, especially in Italy. It numbered at one time eighty houses, but at present the number is reduced to four—namely, the parent house, so called, of Monte Oliveto, in the diocese of Arezzo in Tuscany, one at Rome, one at Genoa, and one at Palermo. The O. order has produced many distinguished ecclesiastics.

OLIVINE. See **CHRYsolITE**.

O'LLA PODRI'DA (literally, *putrid pot*), a Spanish term, originally signifying an accumulation of remains of flesh, vegetables, &c., thrown together into a pot, but generally employed to designate a favourite national dish of the Spaniards, consisting of a mixture of different kinds of meat and vegetables stewed together. It has also come to be figuratively applied to literary productions of very miscellaneous contents. The French equivalent is

pot-pourri, and the Scotch *hotch-potch*, both of which, but especially the former, are also employed in a figurative sense.

O'LMUTZ, the chief fortress of Moravia, Austria, is the capital of a district of the same name, and is situated in lat. 49° 38' N., and in long. 17° 15' E., on an island of the river Morava, which, by means of sluices, can be opened into the moats, and thus made available for purposes of defence. O. is the see of an archbishop, nominated by the chapter, and is the chief seat of the administrative departments. It has a university, founded in 1581, dissolved in 1778, and reorganised in 1827; a library of 50,000 vols.; good natural history, physical, and other museums; a gymnasium, an archiepiscopal seminary, artillery and infantry academies, polytechnic and other schools, a hospital, an asylum for widows and orphans, &c. The most noteworthy of its 13 churches are the cathedral, a fine old building, and the church of St Mauritius, completed in 1412, with its celebrated organ, having 48 stops, and more than 2000 pipes. The noble town-hall, with its complicated clock-work, set up in 1574, and the lofty column on the Oberring, with several fine fountains in the squares, and the splendid archiepiscopal palace and chapter-house, all contribute towards the picturesque aspect for which O. is distinguished. The deficiency in public gardens has of late years been in part supplied by the draining and planting of some of the inner moats, and the conversion of some portions of the fortifications into pleasure-grounds. A mile from the city lies the recently-restored monastery of the Premonstratensians at Hradisch, founded in 1074. O. has a few manufactories of kerseymer, cloth, linen, and porcelain, and is the seat of an extensive trade in cattle from Poland and Moldavia. Pop. 12,000. Prior to 1777, when O. was raised into an archbishopric, its bishops had long been in the enjoyment of the rank of princes of the empire. The city suffered severely during the Thirty Years' War, and again in the Seven Years' Wars of Silesia, when it more than once fell into the hands of the Prussians. In 1848, Ferdinand I. signed his abdication here in favour of his nephew, the present emperor; while in 1850, O. was chosen as the place of conference between the Prussian, Austrian, and Russian plenipotentiaries, for the adjustment of the conflicting differences which had arisen in the German states generally, as the result of the revolutionary movement of 1848.

OLONETZ, a government in the north of Russia, bounded on the W. by Finland, and on the E. and N.-E. by Archangel. Area, exclusive of water, 49,104 square miles. Pop. 290,118. Large lakes abound in this government, the chief, after Lake Onega (q. v.), being Lakes Wygo and Sego. The surface is in general elevated, and about four-fifths of it are covered with wood. The soil is sterile, and the climate is cold and damp. The wealth of the government consists principally in its minerals. Its iron-mines supply the ironworks of Petrasowodsk, and from its quarries marbles are sent to St Petersburg. The principal employments of the inhabitants, who are principally Russians and Finns, and belong to the Greek Church, are carving in wood, fishing and hunting. Many of them also are employed in the ironworks and quarries. The women weave and spin. The government derives its name from the small but ancient town of Olonez. Petrasowodsk is the centre of administration.

OLORON, or **OLORON-SAINTE-MARIE**, a town of France, in the department of Basses-Pyrénées, on the Gave d'Oléron, 15 miles south-west of

Pa. The Church of St Marie is in the transition style from Romanesque to Gothic. The principal articles of manufacture are the chequered handkerchiefs which form the favourite local-dresses of the peasantry of Aragon and Gascony, and also the 'barrets' or caps of the Béarnais. Pop. (1862) 7533.

OLYMPIA, the scene of the celebrated Olympic Games (q. v.), is a beautiful valley in Elis, in the Peloponnesus, through which runs the river Alpheus. As a national sanctuary of the Greeks, O. contained, within a small space, many of the choicest treasures of Grecian art belonging to all periods and states, such as temples, monuments, altars, theatres, and multitudes of images, statues, and votive-offerings of brass and marble. In the time of the elder Pliny, there still stood here about 3000 statues. The Sacred Grove (called the *Altis*) of Olympia, enclosed a level space about 4000 feet long by nearly 2000 broad, containing both the spot appropriated to the games and the sanctuaries connected with them. It was finely wooded, and in its centre stood a clump of sycamores. The *Altis* was crossed from west to east by a road called the 'Pompic Way,' along which all the processions passed. The Alpheus bounded it on the south, the Cladeus, a tributary of the former, on the west, and rocky but gently swelling hills on the north; westward it looked towards the Ionian Sea. The most celebrated building was the *Olympieion*, or *Olympium*, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis in the 6th c. B.C., but was not completed for more than a century. It contained a colossal statue of the god, the master-piece of the sculptor Phidias, and many other splendid figures; its paintings were the work of Pausanias, a relative of Phidias. Next to the Olympieion ranked the *Herœum*, dedicated to Hera, the wife of Zeus, and the Queen of Heaven, containing the table on which were placed the garlands prepared for the victors in the games; the *Pelopœum*, the *Metroum*, the ten *Theauri* or Treasuries, built for the reception of the dedicatory offerings of the Greek cities, the temples of Eileithyia and Aphrodite also deserve mention; the *Stadium* and the *Hippodrome*, where the contests took place, stood at the eastern end of the *Altis*. The ploughshare now passes through the scene of these contests, but many ruins still attest the ancient magnificence of the buildings. Explorations, attended with great success, have been made by the French commission of the Morea.

OLYMPIAD (Gr. *olympias*), the name given to the period of four years that elapsed between two successive celebrations of the Olympic Games (q. v.); a mode of reckoning which forms the most celebrated chronological era among the Greeks. The first recorded olympiad dates from the 21st or 22d of July 776 B.C., and is frequently referred to as the Olympiad of Corœbus; for historians, instead of referring to the olympiad by its number, frequently designate it by the name of the winner of the foot-race in the Olympic games belonging to that period, though at times both the number and the name of the conqueror are given. A slight indefiniteness is frequently introduced into Greek chronology, from the custom of mentioning only the olympiad, neglecting to specify in which year of the olympiad a certain event happened. As this era commenced in 776 B.C., the first year of our present era (1 A.D.) corresponded to the last half of the fourth year of the 194th with the first half of the first year of the 195th olympiad, and 394 A.D. corresponds to the second year of the 233d olympiad, at which time reckoning by olympiads terminated. This era is used only by writers, and is never found on coins, and very seldom on

inscriptions. Another olympic era, known as the 'New Olympic Era,' was commenced by the Roman emperors, and dates from 131 A.D.; it is found both in writings, public documents, and inscriptions.

OLYMPIAS, the wife of Philip II., king of Macedon, and mother of Alexander the Great. She was the daughter of Neoptolemus I., king of Epirus. She possessed a vigorous understanding, but was of a most passionate, jealous, and ambitious character. Philip having, on account of disagreements, separated from her and married Cleopatra, niece of Attalus (337 B.C.), she went to reside with her brother Alexander, king of Epirus, where she incessantly fomented intrigues against her former husband, and is believed to have taken part in his assassination by Pausanias, 337 B.C. On the accession of her son Alexander to the throne, she returned to Macedonia, where she contributed to bring about the murder of Cleopatra and her daughter. Alexander was filled with indignation, but O. was his mother, and he could not obey the dictates of justice. During his brief but magnificent career he always treated her with the utmost reverence and esteem, though he never allowed her to meddle with his political schemes. After his death she endeavoured to get possession of the vacant throne, and obtained the support of Polysperchon in her designs. In 317, the two defeated Arrhidæus, the weak-minded step-brother and successor of Alexander, and his wife Eurydice, whom she caused to be put to death in the same year. She now began to glut her revenge on such of the Macedonian nobles as had shewn themselves hostile to her; but her cruelties soon alienated the minds of the people from her, even though she was the mother of their heroic king, whereupon Cassander (q. v.), her principal adversary, marched north from the Peloponnesus, besieged her in Pydna, and forced her to surrender in the spring of 316 B.C. She was immediately afterwards put to death. O. was a woman of heroic spirit, but of fierce and uncontrollable passions, and in the perpetration of crime, when she reckoned it necessary, displayed an unscrupulousness peculiarly feminine.

OLYMPIC GAMES, the most splendid national festival of the ancient Greeks, were celebrated every fifth year in honour of Zeus, the father of the gods, on the plain of Olympia (q. v.). Their origin goes back into prehistoric ages. According to the myth elaborated or preserved by the Elean priests, they were instituted by the Idæan Herakles in the time of Kronos, father of Zeus; according to others, by the later Herakles, son of Zeus and Alkmene; while Strabo, rejecting the older and more incredible legends, attributes their origin to the Herakleids after their conquest of the Peloponnesus. But the first glimpses of anything approaching to historic fact in connection with the games is their so-called revival by Iphitos, king of Elis, with the assistance of the Spartan lawgiver, Lycurgus, about 884 B.C.; or, according to others, about 828 B.C., an event commemorated by an inscription on a disc kept in the *Herœum* at Olympia, which Pausanias (flor. 2d c. A.D.) saw. That festive games were celebrated here, in other words, that Olympia was a sacred spot, long before the time of Iphitos, can indeed hardly be doubted: the universal tradition that the Elean king had only 'revived' the games proves this; but nothing whatever can be historically ascertained concerning their origin, character, or frequency, in this remoter time. Iphitos may, therefore, be regarded as their founder, yet the reckoning of time by Olympiads (q. v.)—the real dawn of the historical period in Greek history—did not begin till more than a century later. At

first, it is conjectured, only Peloponnesians resorted to the Olympic games, but gradually the other Greek states were attracted to them, and the festival became *Pan-Hellenic*. Originally, and for a long time, none were allowed to contend except those of pure Hellenic blood; but after the conquest of Greece by the Romans, the latter sought and obtained this honour, and both Tiberius and Nero figure in the list of Roman victors. Women—with one exception, the priestess of Demeter Chamyne—were forbidden to be present, on pain of being thrown headlong from the Tysæan Rock. The games were held from the 11th to the 15th of the Attic month *Hekatombaion* (our July—August), during which, first throughout Elis, and then throughout the rest of Greece, heralds proclaimed the cessation of all intestine hostilities; while the territory of Elis itself was declared inviolable. The combatants were required to undergo a preparatory training for ten months in the gymnasium at Elis, and during the last of these months the gymnasium was almost as numerously attended as the games themselves. Much uncertainty prevails as to the manner in which the contests were distributed over the different days. Krause (*Olympia*, p. 106) suggests the following order: On the first day the great initiatory sacrifices were offered, after which the competitors were properly classed and arranged by the judges, and the contests of the trumpeters took place; the second day was set apart for the boys who competed with each other in foot-races, wrestling, boxing, the pentathlon, the pankration, horse-races; the third and principal day was devoted to the contests of men in foot-races of different kinds (as, for example, the simple race, once over the course; the *diaulos*, in which the competitors had to run the distance twice; and the *dolichos*, in which they had to run it seven or twelve times); wrestling, boxing, the *pankration* (in which all the powers and skill of the combatants were exhibited), and the race of *hoplites*, or men in heavy armour; on the fourth day came off the *pentathlon* (contest of five games—viz, leaping, running, throwing the discus, throwing the spear, and wrestling), the chariot and horse races, and perhaps the contests of the heralds; the fifth day was set apart for processions, sacrifices, and banquets to the victors (called *Olympionikoi*), who were crowned with a garland of wild olive twigs cut from a sacred tree which grew in the Altis (see OLYMPIA), and presented to the assembled people, each with a palm branch in his hand, while the heralds proclaimed his name, and that of his father and country. On his return home, he was received with extraordinary distinction: songs were sung in his praise (14 of Pindar's extant lyrics are devoted to *Olympionikoi*); statues were erected to him, both in the Altis and in his native city; a place of honour was given him at all public spectacles; he was in general exempted from public taxes, and at Athens was boarded at the expense of the state in the Prytaneion.

The regulation of the games belonged to the Eleans, from whom were chosen the *hellanodikai*, or judges, whose number varied. At first there were only two, but as the games became more and more national, and consequently more numerous, they were gradually increased to ten, sometimes even to twelve. They were instructed in their duties for ten months beforehand at Elis, and held their office only for one year. The officers who executed their commands were called *alytai*, and were under the presidency of an *alytarch*.—See Krause's *Olympia oder Darstellung der grossen Olympischen spiele* (Wien, 1838).

OLYMPIODORUS, one of the latest of the Alexandrian Neoplatonists, flourished in the first

half of the 6th c. after Christ, during the reign of the Emperor Justinian. Regarding his life nothing is known. Of his writings, we possess a *Life of Plato*, with commentaries or scholia on several of his dialogues, the *Gorgias*, *Philebus*, *Phædo*, and *Alcibiades I.* In these he appears as an acute and vigorous thinker, and as a man of great erudition. O.'s *Life of Plato* was published by Wetstein (1692), Etwall (Lond. 1771), and Fischer (Leips. 1783); the best edition of the scholia is that of Mystoxides and Schinas (Venice, 1816).

OLYMPUS, the ancient name of several mountains or chains of mountains—e. g., of the north-western continuation of Taurus in Mysia, of a mountain in the island of Cyprus, of one in Lycia, of another in Elis, of one on the borders of Laconia and Arcadia, and of another on the frontiers of Thessaly and Macedonia. Of these, the last-mentioned (now called *Elymbo*) is the most famous. Its eastern side, which fronts the sea, is composed of a line of vast precipices, cleft by ravines, filled with forest-trees. Oak, chestnut, beech, plane tree, are scattered abundantly along its base, and higher up appear great forests of pine, as in the days of the old poets of Greece and Rome. With Euripides, it is *poludendros Olympus*; with Virgil, *frondens Olympus*; and with Horace, *opacus Olympus*. Its highest peak is 9754 feet above the level of the sea, and is covered with snow for about nine months of the year. It was regarded by the ancient Greeks as the chief abode of the gods, and the palace of Zeus was supposed to be upon its broad summit. According to Greek legend, it was formerly connected with Ossa, but was separated from it by an earthquake, allowing a passage for the Peneius through the narrow vale of Tempe to the sea. The philosophers afterwards transferred the abode of the gods to the planetary spheres, to which they likewise transferred the name of Olympus.

OM is a Sanscrit word which, on account of the mystical notions that even at an early date of Hindu civilisation were connected with it, acquired much importance in the development of Hindu religion. Its original sense is that of emphatic or solemn affirmation or assent. Thus, when in the White-Yajur-Veda (see VEDA) the sacrificer invites the gods to rejoice in his sacrifice, the god Savitri assents to his summons by saying: 'Om (i.e., be it so); proceed!' Or, when in the Brîhad-âran'yaka-Upanishad, Prajâpati, the father of gods, men, and demons, asks the gods whether they have understood his instruction; he expresses his satisfaction with their affirmative reply, in these words: 'Om, you have fully comprehended it'; and, in the same Upanishad, Pravâhan's answers the question of S'wetaketu, as to whether his father has instructed him, by uttering the word 'Om,' i.e., 'forsooth (I am).' A portion of the Rîgveda, called the Aitareya-Brâhmana, where describing a religious ceremony at which verses from the Rîgveda, as well as songs called Gâthâs, were recited by the priest called Hotri, and responses given by another priest, the Adhwaryu, says: 'Om is the response of the Adhwaryu to the Rîgveda verses (recited by the Hotri), and likewise *tathâ* (i.e., thus) his response to the Gâthâs, for Om is (the term of assent) used by the gods, whereas *tathâ* is (the term of assent) used by men' (the Rîgveda verses being, to the orthodox Hindu, of divine, and the Gâthâs of human, authorship). In this, the original sense of the word, it is little doubtful that om is but an older and contracted form of the common Sanscrit word *avam*, 'thus,' which, coming from the pronominal base 'a'—in some derivations changed to 'e'—may have at one time occurred in the form *avam*, when, by the elision

that it is now-a-days often used by the natives of India in the sense of 'yes,' without, of course, any allusion to the mystical properties which are ascribed to it in the religious works. See also the article OM MANI PADME HŪM.

That there exists no connection whatever, as has been supposed by some writers to be the case, between *Om* and *Amen*, requires scarcely any remark, after the etymological explanations given above; but it may not be without interest to observe that, though the derivation of *Om*, as a curtailment of *av-man*, from *av*, 'protect, save,' is probably merely artificial, and, as stated before, invented to explain the later mystical use of the Vedic word, it seems more satisfactory to compare the Latin *omen* with a Sanscrit *avman*, 'protection,' as derived by the grammarians from *āv* (in the Latin *āve-o*), than to explain it in the fashion of the Roman etymologists: 'Omen, quod ex ore primum elatum est, osmen dictum;' or, 'Omen velut oremen, quod fit ore augurium, quod non avibus aliove modo fit.' And since *pra-nava*, from Sanscrit *nu*, 'praise,' is, like *Om*, used in the sense of 'the deity,' it is likewise probable that *numen* does not come, as is generally believed, from Latin *nu-(ere)*, 'nod,' but from a radical corresponding with the Sanscrit *nu*, 'praise.'

OM MANI PADME HŪM is the 'formula of six syllables' which has acquired much celebrity from the conspicuous part which it plays in the religion of the Buddhists, and especially in that form of it called *Lamaism* (q. v.). It is the first subject which the Tibetans and Mongols teach their children, and it is the last prayer which is muttered by the dying man; the traveller repeats this formula on his journey, the shepherd when attending his flock, the housewife when performing her domestic duties, the monk when absorbed in religious meditation, &c. It is met with everywhere; on flags, rocks, trees, walls, columns, stone-monuments, domestic implements, skulls, skeletons, &c. It is looked upon as the essence of all religion and wisdom, and the means of attaining eternal bliss. 'These six syllables,' it is said, 'concentrate in themselves the favour of all the Buddhas, and they are the root of the whole doctrine . . . ; they lead the believer to re-birth as a higher being, and are the door which bars from him inferior births; they are the torch which illuminates darkness, the conqueror of the five evils;' &c. They are likewise the *symbol* of transmigration; each syllable successively corresponding with, and releasing from, one of the six worlds in which men are reborn; or they are the mystical designation of the six transcendental virtues, each successive syllable implying self-offering (*dāna*), endurance (*kṣānti*), chastity (*s'tla*), contemplation (*dhyāna*), mental energy (*vīrya*), and religious wisdom (*prajñā*). The reputed author of this formula is the Dhyāni-Bodhisattwa, or deified saint, *Avalokites'wara*, or, as the Tibetans call him, *Padmapān'i* (i. e., the lotus-handed). It would not belong, accordingly, to the earliest stage of Buddhism, nor is it found in the oldest Buddhist works of the north of India or of Ceylon. Its original sense is rather obscure. Some suppose that it means O! (*ōm*), the jewel (*man'i*) in the lotus (*padme*), amen (*hūm*); 'the jewel' being an allusion to the saint *Avalokites'wara* himself, and the word '*padme*, or in the lotus,' to the belief that he was born from a lotus. It is probably, however, more correct to interpret the formula thus: 'Salvation (*om*) [is] in the jewel-lotus (*man'i-padme*), amen (*hūm*);' when the compound word 'jewel-lotus' would mean the saint and the flower whence he arose. If this interpretation be correct, the formula would be originally nothing more than

a salutation addressed to *Avalokites'wara* or *Padmapān'i*; and the mystical interpretation put upon each syllable of it, would then be analogous to that which imparted a transcendental sense to each of the letters of the syllable *Om* (q. v.). Dr Emil Schlagintweit, in his valuable work on *Buddhism in Tibet* (Leipzig, 1863), relates (p. 120) that 'in a prayer-cylinder which he had the opportunity of opening, he found the formula printed in six lines, and repeated innumerable times upon a leaf 49 feet long and 4 inches broad. When Baron Schilling de Canstadt paid a visit to the temple Subulin, in Siberia, the Lamas were just occupied with preparing 100,000,000 of copies of this prayer to be put into a prayer-cylinder; his offer to have the necessary number executed at St Petersburg was most readily accepted, and he was presented, in return for the 150,000,000 of copies he forwarded to them, with an edition of the Kanjur, the sheets of which amount to about 40,000. When adorning the head of religious books, or when engraved upon the slabs resting on the prayer-walls, the letters of the formula are often so combined as to form an anagram. The longitudinal lines occurring in the letters "*man'i padme hūm*" are traced close to each other, and to the outer longitudinal line at the left are appended the curved lines. The letter "*om*" is replaced by a symbolical sign above the anagram, shewing a half-moon surmounted by a disc indicating the sun, from which issues a flame. Such a combination of the letters is called in Tibetan *nam chu wangdan*, "the ten entirely powerful (viz., characters, six of which are consonants, and four vowels);" and the power of this sacred sentence is supposed to be increased by its being written in this form. These kind of anagrams are always bordered by a pointed frame indicating the leaf of a fig-tree."—See also E. Burnouf, *Introduction à l'Histoire du Bouddhisme Indien* (Paris, 1844); C. F. Koepfen, *Die Religion des Buddha* (Berlin, 1857—1859); and the works quoted by these authors.

OMAGH (Irish, *Oigh magh*, 'seat of the chiefs'), an ancient town, capital of the county of Tyrone in Ireland, situated on the river Strule, distant 34 miles south from Londonderry, and 110 miles north-west from Dublin, with both which cities it is connected by railway. O. grew up around an abbey founded in the year 792, but is first heard of as a fortress of Art O'Nial in the end of the 15th c., about which time it was forced to surrender to the English, although its possession long continued to alternate between Irish and English hands. It formed part of James I.'s 'Plantation' grants, and was strongly garrisoned by Mountjoy. On its being evacuated by the troops of James II. in 1689, it was partially burned, and a second (accidental) fire in 1743 completed its destruction. But it has been well rebuilt, and is now a neat and prosperous town. Pop. in 1861, 3448, of whom 2150 are Catholics, 731 Protestants of the Established Church, and the rest Protestants of other denominations. O. contains a very handsome court-house, several neat churches (Roman Catholic, Protestant, and Presbyterian), a convent, several partially endowed and national schools, a district lunatic asylum, and the workhouse of the Poor-Law Union of which it is the centre. Its trade is chiefly in brown linens, corn, and agricultural produce.

OMAHA CITY, the capital of Nebraska Territory, U. S., is on the right bank of the Missouri River, opposite Council Bluffs, and 20 miles north of the mouth of the Nebraska River. Besides the government offices, it has a large trade by the rivers, and across the prairies, and will soon be connected by railways with the principal

place, and intrenched themselves at Oltenitza. On November 4, the latter division were attacked by 9000 Russians, whom they totally defeated with a loss of nearly 4000 men and almost all their officers. The Russians also received two severe checks at Kalafat, on January 6 and March 15, 1855. O. kept up the spirit of his troops by occasional successful skirmishes with the Russians, and threw a garrison of 8000 men into Silistria. In the following spring the Russians passed the Danube at two points, and laid siege to Silistria (q. v.), but their assaults were invariably repulsed with severe loss. The Russians then withdrew from the Principalities, and O. entered Bucharest in triumph in August 1854. On 9th February 1855, he embarked for Eupatoria, where, on the 17th of the same month, he was suddenly attacked by 40,000 Russians, who were repulsed with great loss. He was soon afterwards (October 3, 1855) sent to relieve Kars, but arrived too late, and the armistice which followed (February 29, 1856) put a stop to his military career. He was subsequently made governor of Bagdad; but having been accused of maladministration, was banished to Kaarport in 1859. He was recalled in the following year, and in September 1861 was sent to pacify Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, who had been the instigators of these rebellions, captured their chief town of Cetinji, overran the country, and reduced it to the condition of a tributary state (9th September 1862). O. is Grand-cross of the Legion of Honour and a Knight of the Russian Order of St Anne.

OMBAY, or MALOEWA (Maluwa), an island between Celebes and the north-west coast of Australia, lies to the north of Timor, from which it is separated by the Strait of Ombay, lat. 8° 8'—8° 28' S., long. 124° 17'—125° 7'. Area, 961 square miles. In 1853 the population amounted to 193,751. The hills of O. are volcanic, and the coasts steep and difficult to approach. The inhabitants are dark brown, have thick lips, flat nose, and woolly hair; appearing to be of mixed Negro and Malay origin. They are armed with the bow, spear, and creese, and live on the produce of the chase, with fish, cocoa-nuts, rice, and honey. A portion of the island formerly belonged to the Portuguese, but since August 6, 1851, it is entirely a Netherlands possession. The Dutch postholder resides at the village of Alor, to which iron wares, cotton goods, &c., are brought from Timor, and exchanged for wax, edible nests, provisions, and other native products. O. has oxen, swine, goats, &c., and produces maize, cotton, and pepper. Amber is also found, and the Boeginese of Celebes import European and Indian fabrics, exchanging them for the produce of the island, which they carry to Singapore.

O'MEARA, BARRY EDWARD, was born in Ireland in the year 1786. Otherwise without claim to be remembered, his name remains notable from his connection with the first Napoleon, whom he accompanied to St Helena as household physician. At the age of 18 he entered the British army as assistant-surgeon. In 1808, being stationed at Messina, he became concerned in a duel as second, under circumstances which must more or less have been held discreditable, as his dismissal from the service by sentence of court-martial was the result. Afterwards he succeeded in procuring an appointment as surgeon in the navy, and as such for some years is certified to have discharged his duties with zeal and efficiency. As it chanced, he was serving with Captain Maitland in the Bellerophon when the Emperor Napoleon (q. v.) surrendered himself to

that officer. During the voyage from Rochefort to Plymouth he was introduced to Napoleon, on whom the impression he produced was favourable, leading to a proposal that he should accompany the emperor into exile as private physician, an arrangement to which he acceded, stipulating that he should retain his rank in the navy, and be permitted to return to it at pleasure. By Napoleon, with whom he remained in daily intercourse at St Helena for about three years, he seems to have been admitted to something more or less like intimacy; and occasionally it might well be, as he says, that the great captive would kill the creeping hours by loose talk with his attendant over the events of his strange life. Of these conversations O'M. naturally enough took notes, which he afterwards published. Meantime he became involved in the interest of Napoleon, in the series of miserable and petty squabbles which he waged with the governor, Sir Hudson Lowe (q. v.). The result of these, as regards O'M., was that in 1818, after a violent altercation with Sir Hudson, he was committed to close arrest, and was authorised by the emperor to resign his post. On his return to England, he addressed a letter to the Admiralty, in which, among other things, he accused Sir Hudson Lowe of intentions against the life of his captive, and even of having, by dark hints to himself, insinuated a desire for his services as secret assassin. For this he was instantly dismissed the service. The accusation was plainly monstrous and incredible. In 1822, after Napoleon's death, O'M. published *Napoleon in Exile*, by which book alone he is now remembered. As conveying to the world the first authentic details of the prison-life of the great deceased, it made on its appearance an immense sensation, and—though for obvious reasons everywhere to be accepted, if at all, with caution—it is still not utterly without interest. The last years of O'M.'s life were passed in obscurity in the neighbourhood of London, where, in 1836, he died.

O'MELET, or OMELETTE, French, a dish chiefly composed of eggs. These are broken, and their contents put into a proper vessel, in which they are whipped into a froth, which is poured into a very clean and dry frying-pan, with the addition of lard or butter to prevent sticking, and then fried carefully, so that the outside is nicely browned. Before frying, one of a number of ingredients may be added to vary the omelette, such as chopped savoury herbs, minced ham or bacon, salt-fish, shell-fish, game, &c. Or sweet omelettes may be made by placing preserved fruits upon them when quite or nearly cooked. The omelette is an excellent dish, and, simple though it be, it requires much skill to prepare it successfully.

O'MEN (for the deriv., see *Omen*), or **PRODIGY** (generally said to be from *pro* and *dico*, but more probably from *pro* and *ago*, to lead; hence anything conspicuous, or extraordinary), the name given by the Romans to signs by which approaching good or bad fortune was supposed to be indicated. The terms *Omen* and *Prodigy* were not, however, exactly synonymous; the former being applied rather to signs received by the ear, and particularly to spoken words; the latter to phenomena and occurrences, such as monstrous births, the appearance of snakes, locusts, &c., the striking of the foot against a stone or the like, the breaking of a shoe-tie, and even sneezing, &c. If an omen or prodigy was promised on the part of a god, it was to be interpreted according to the promise; but otherwise, the interpretation was extremely arbitrary. It was supposed that evil indicated as approaching might be averted by various means, as by sacrifices,

conference, and ordered a general massacre of them. Two only escaped: the one to the south-east of Arabia, where he was recognised as calif, and his descendants reigned till the 16th century; the other, Abderrahman, to Spain, where he founded the califate of Cordova.

OMMIADES OF SPAIN.—**ABDERRAHMAN I.** (755—787), on accepting the Spanish throne which was offered him by the Arab chiefs, assumed the titles of *Calif* and *Emir-al-mumenin*, and in spite of numerous revolts, strengthened and extended his power in Spain, till, with the exception of Asturias and the country north of the Ebro, his authority was everywhere acknowledged. His defeat of Charlemagne at Roncevaux (q. v.) is too widely known to require further notice. He divided his kingdom into six provinces, whose rulers, with the *walis* of the twelve principal towns, formed a sort of national diet. His successors, **HESHAM I.** (787—796) and **AL-HAKEM I.** (796—821), were much troubled with internal revolts, under cover of which the Christians in the north-east established the state known as the 'Spanish March.' **ABDERRAHMAN II.** (821—852) re-established internal quiet, and occupied his subjects with incessant wars against the Christians. These conflicts developed among the Arabs that chivalrous heroism which is found nowhere else in the Mohammedan world. Abderrahman, himself a man of learning, greatly encouraged the arts and sciences, and diffused information among his people; he also attempted, by regulating the laws of succession to property, to constitute his kingdom on a basis analogous to that of other European nations. During his reign Mohammedan Spain was the best governed country in Europe. His successors, **MOHAMMED I.** (852—880), **MONDHAR** (880—882), and **ABDALLAH** (882—912), followed in his footsteps. **ABDERRAHMAN III.** (912—961), after suppressing some dangerous revolts which had gathered head during his minority, conquered the kingdom of Fez from the Edrisites, and brought a long and exhausting war with the powers of Asturias and Leon to a victorious conclusion. This period is justly termed the golden age of the Arab domination in Spain, for at no period was their power so consolidated, and their prosperity so flourishing. Abderrahman, like his predecessors, was a great encourager of learning, and a poet of no mean ability. He founded schools which far surpassed those in other parts of Europe. His son, **AL-HAKEM II.** (961—976), was in every way worthy to be his successor, but his premature death was the cause of the downfall of the Ommiades in Spain. **HESHAM II.** (976—about 1013), a child of eight years, now occupied the throne; but fortunately his mother, Sobeiha, possessed the abilities necessary for such an emergency, and appointed as her son's vizier Mohammed ben Abdallah, surnamed Al-Mansor, who had originally been a peasant. This remarkable man gained the affections of all ranks by his pleasing manners and great abilities; his administration was equally just and judicious, and his encouragement of literature, science, and art alike liberal and discriminating. But it is as a warrior that he is chiefly remembered; he had vowed eternal enmity to the Christians, and in all his numerous expeditions fortune seemed chained to his standard. The lost provinces were recovered; Castile, Leon, and Barcelona were conquered; and Navarre was on the point of sharing the same fate, when a rebellion in Fez compelled him to detach a portion of his force for service in Africa, and the combined armies of the four Christian monarchies, seizing this opportunity, inflicted upon the Arabs a sanguinary defeat in 1001. Mohammed's spirit was completely broken

by this blow, and he died a few days afterwards. With him the star of the house of Ommeyah set for ever. The rest of Hesham's reign was a scene of disorder and civil war. Pretenders to the califate arose, while the 'walis' of the various provinces set up as independent rulers, and the invasions of the Christians added to the confusion. Hesham finally resigned the throne about 1013; and, with the exception of the brief reign of **HESHAM III.** (1027—1031), from this time the family of Ommeyah, which had for more than two centuries so happily and brilliantly governed the greater part of Spain, disappears from history. One remarkable feature of their rule deserves mention, as it contrasts them so favourably with the contemporary and subsequent rulers of Spain, even to the present time, and that is their universal toleration in religious matters.

O'MNIBUS (Lat. *omnibus*, 'for all'), familiarly contracted into 'bus,' is the largest kind of public street conveyance, and is appointed to travel between two fixed stations, starting at certain fixed hours, and taking up or setting down passengers at any point in its route. Vehicles of this sort were first started in Paris in 1662, when it was decreed, by a royal edict of Louis XIV., that a line of *carrosses à cinq sous* ('twopence-halfpenny omnibuses'), each containing eight places, should be established for the benefit of the infirm, or those who, requiring speedy conveyance from one part of the town to another, were unable to afford a hired carriage for themselves; these 'carrosses' were bound to run at fixed hours from one station to another, whether full or empty. The public inauguration of the new conveyances took place March 18, 1662, and was the occasion of a grand fête; and the novelty took so well with the Parisians, that the omnibuses were for some time monopolised by the wealthier classes. However, when the rage for them died away, it was found that those for whose special benefit they were instituted made no use of them, and they, in consequence, gradually disappeared. The omnibus was not revived in Paris till 1827, when it was started in its present form, carrying from 15 to 18 passengers inside, with only the driver above and the conductor behind; and on July 4, 1829, they were introduced into London by a Mr Shillibeer. Shillibeer's conveyances, which for some time afterwards were known as *shillibeers* (an epithet still in common use in New York), were of larger size than the French ones, carrying 22 passengers inside, and were drawn by three horses abreast. The omnibus was introduced into Amsterdam in 1839, and since that time its use has been extended to all large cities and towns in the civilised world. The seats of the omnibus are generally placed lengthwise, and the door behind. The omnibus is under the management of a driver and a conductor. In New York, omnibuses are drawn on street-railways; but this practice, though introduced into several towns of Great Britain, has not met with general approval.

O'MNIUM, a term used at the Stock Exchange to express the aggregate value of the different stocks in which a loan is funded. See *M'Culloch's Dictionary of Commerce*.

OMSK, a town of Western Siberia, in the government of Tobolsk, stands on both banks, and at the confluence of the Om—a river upwards of 200 miles in length—with the Irtysh; 2225 miles from St Petersburg. Lat. 54° 59' N., long. 73° 62' E. It was built in 1716, as a defence against the Khirghiz; but is now of no importance as a fortress. It is the centre of government for Western Siberia, is the residence of the governor-general, the centre of the administration of the Siberian Khirghiz, the seat of

Egypt by the British army in 1805, but erroneously, as it was cultivated in some parts of Britain long before. It is in very general cultivation among the peasantry in some parts of Scotland.—The PEARL O. is a similar variety, with much smaller bulbs.—The TREE O. is also generally regarded as a variety of the common onion. It produces bulbs at the top of the stem, the umbels becoming viviparous.—Onions are similar to Garlic (q. v.) in medicinal properties, but milder. As a condiment or article of food, they agree well with some stomachs and stimulate digestion, but are intolerable to others. Roasted onions with oil make a useful emollient and stimulating poultice for suppurating tumours. The use of onions stimulates the secreting organs.—The CIBOL or WELSH O. (*A. fistulosum*), a native of Siberia, cultivated in Britain, but more generally in Germany, has a perennial fibrous root, with no bulb, very fistular leaves, and a 3-cornered ovary. It is useful as supplying tender green leaves for culinary use in the beginning of spring, like the chive, and somewhat earlier in the season. It is much larger than the chive, but its use is similar.

ONISCUS. See WOODLOUSE.

ONKELOS, the supposed author of an Aramaic version (Targum) of the Pentateuch. The name seems a corruption from that of Akilas, one of the Greek translators of the Old Testament (see VERSIONS). The translation, said to be by O., is, in its present shape at least, probably the work of the Babylonian schools of the 3d and 4th centuries A.D. At first orally transmitted, various portions of it began to be collected and written down in the 2d c., and were finally redacted about the time mentioned. The history of the origin and growth of Aramaic versions in general will be treated under Targum (VERSIONS). The idiom of O. closely resembles that of Ezra and Daniel. The translation itself is executed in accordance with a sober and clear, though not a slavish exegesis, and keeps closely to its text in most instances. In some cases, however, where the meaning is not clear, it expands into a brief explanation or paraphrase, uniting the latter sometimes with Haggadic by-work, chosen with tact and taste, so as to please the people and not to offend the dignity of the subject. Not unfrequently it differs entirely from the original, as far, e. g., as anthropomorphisms and anthropopathies—anything, in fact, which might seem derogatory to the Deity—are concerned. Further may be noticed a repugnance to bring the Divine Being into too close contact, as it were, with man, by the interposition of a kind of spiritual barrier (the 'Word,' 'Shechinah,' 'Glory') when a conversation, or the like, is reported between God and man. Its use lies partly in a linguistic, partly in a theological direction; but little has been done for its study as yet. Notwithstanding the numerous MSS. of it extant in almost all the larger libraries of Europe, and in spite of the grossly incorrect state of our current printed editions, no critical edition has ever been attempted.

ONOBRYCHIS. See SAINTFOIN.

ONOMACRITUS, a celebrated religious poet of ancient Greece, lived at Athens in the time of the Peisistratidæ. He collected and expounded—according to Herodotus—the prophecies or oracles of MUSEUS (q. v.), but is said to have been banished from the city by Hipparchus, about 516 B.C., on account of interpolating something of his own in these oracles. He then, we are told, followed the Peisistratidæ into Persia, and while there was employed by them in a very dishonourable way. They got him to repeat to Xerxes all the ancient sayings that seemed to favour his meditated

invasion of Greece. Some critics, among whom is Aristotle, have inferred from a passage in Pausanias that O. is the author of most of the so-called Orphic hymns. More certain, however, is the view which represents him as the inventor of the great Orphic myth of Dionysus Zagreus, and the founder of Orphic religious societies and theology. Pausanias states that 'Onomacritus established orgies in honour of Dionysus, and in his poems represented the Titans as the authors of the sufferings of Dionysus.' See Müller's *Geschichte der Griech. Literatur bis auf das Zeitalter Alexander's* (Breslau, 1841); Grote's *History of Greece*, &c.

ONOMATOPEIA, the Latin form of the Greek word *onomatopoeia*, means literally the making or invention of names, and is used in philology to denote the formation of words in imitation of natural sounds, as in *cuckoo*, Lat. *cucu(lus)*; *pee-wee*, Scan. *pee-weip*, Dutch, *kiewit*; *cock*; *clash*, *rap*, *tap*, *quack*, *rumble*, *whizz*, *clang*. Such words are sometimes called *onomatopœias*; more properly, they are *onomatopœian*, or formed by *onomatopœia*.

In a more extended sense, the term is applied to the rhetorical artifice by which writers (chiefly poets) seek, through the choice and arrangement of words, to make the 'sound,' throughout whole phrases and sentences, 'an echo to the sense,' as in Homer's well-known *poluphloisboio thalasses*, expressive of the breaking of waves upon the seashore; or where Tennyson makes the sea

Roar rock-thwarted under bellowing caves.

The occurrence of so many obviously onomatopœian words in all known languages, suggests the question, whether the same principle may not have been concerned in producing the original germs or roots of the great bulk of words. There is little hope that the question will ever be conclusively settled either way; for the changes of time have made it, in most cases at least, impossible to say what the first form and signification of a root were; but the balance of arguments seems in favour of the affirmative answer. 'The action of the mind,' as it has been expressed, 'produced language by a spontaneous repercussion of the impressions received.' Now, the articulate sound first affixed in this way to an object or an action as its sign cannot be conceived as arbitrary; nor is there any mysterious and inherent correspondence between any one conception of the mind, and a particular articulate sound. The sound uttered must have been suggested by something connected with the object or action itself; and by what more naturally than by the inarticulate sound which the object or action itself emits?

The chief objection to this theory is, that if the first words were merely reproductions of natural sounds, the same natural objects would have had the same names all the world over. To which it is answered, that the mind in its first efforts at naming did not seek an exact reproduction of the sound, but a suggestive imitation; primitive words were not echoes, but 'artistic representations.' Now, the sounds of nature are not simple, but composite. Like other concrete phenomena, they present a variety of aspects; and according as one or another aspect seemed the most prominent to the observer, a different vocal sound would suggest itself as the appropriate symbol. Thus, when Professor Max Müller argues (*Science of Language*, Lond. 1861) that if the 'bow-wow' theory, as he nicknames it, were true, men would have everywhere spoken of a *moo*, as is done in the nursery, and not of a *cow*; it seems a valid answer to say, that the Indian *gu*, the Teut. *kuh* (Eng. *cow*), and the Græco-Lat. *bos*, are really as suggestive imitations of the animal's

actual voice as *moa*. To take a more striking instance: few words differ more in sound and aspect than the Eng. *thunder* (Ger. *donner*, Lat. *tonitru*, Fr. *tonnere*) does from the Mexican name for the same thing, *tlallatniztl*, and yet it would be difficult to say which is the more suggestive of the natural sound.

It is no doubt true that the great bulk of names are derived from roots having a general predicative power; but this by no means excludes the principle of onomatopoeia. Thus, to take one of the instances adduced by Professor Müller himself, that of *raven* or *crow* (Sans. *kāraṇa*, Lat. *corvus*, Gr. *korōnē*); this is derived from the root *ru* or *kru*, which means to cry or call, and the bird was called a *kāraṇa*, or *crow*, not in imitation of his voice, but because he was 'a shouter, a caller, a crier. The name might have been applied to many birds, but it became the traditional and recognised name of the crow.' But how came the articulation *ru* or *kru* to be chosen to convey the general meaning of crying or calling; may we not suppose that it was suggested by the voice of birds of the crow kind, whose notes are most markedly cries or calls to their fellows, as distinguished from singing? Once adopted in this particular case, it would naturally be extended to any kind of cry or call, from the harshest to the softest.

ONTARIO, the easternmost and smallest of the five great lakes of North America, lies in 43° 10'—44° 8' N. lat., and 76° 30'—80° W. long. At its south-west corner it receives the waters of the upper lakes by the Niagara, and at its north-east corner it issues into the St. Lawrence; which for some distance below is called the Lake of the Thousand Isles. Its surface, which varies a few feet with the seasons, is about 330 feet below that of Lake Erie and 224 feet above tide-water. Its bottom, therefore, must be considerably lower than the level of the Atlantic, as it is in some places 600 feet deep. It is 190 miles long, 55 in its widest part, and about 480 in circumference. Sufficiently deep throughout for vessels of the largest tonnage, it has many convenient and thriving ports, of which the chief are Kingston, Port Hope, Cobourg, Toronto, Hamilton, on the Canadian shore, and Oswego, Sackett's Harbour, Port Genesee in the United States. Its navigation has been facilitated by the erection of 15 light-houses on the American side, and 13 on the Canadian; while it is connected with Lake Erie by the Welland Canal, with the Erie Canal and New York by the Oswego Canal, and by the Rideau Canal with the Ottawa. Lake O. is subject to violent storms, and it is probably owing chiefly to the constant agitation of its waters that it freezes only for a few miles from the shore. The shores of Lake O. are generally very flat, but the Bay of Quinte, a long crooked arm of the lake, which stretches about 50 miles, possesses some attractive scenery. Burlington Bay, on which Hamilton lies, is a large basin, almost entirely enclosed by a natural, but strangely accumulated bank of sand, which forms a beautiful drive for the citizens.

ONTO'LOGY. See METAPHYSICS.

ONUS PROBANDI, i. e., the burden of proof, is often a difficult question in litigation; but as a general rule, the plaintiff who institutes the suit is bound to give proof of the allegations on which he relies. There are many nice and technical rules on the subject, both in suits and actions, which are too minute to be here stated.

ONYX, an agate formed of alternating white and black, or white and dark-brown stripes of chalcedony. More rarely, a third colour of stripes occurs. The finest specimens are brought from

India. O. is in much esteem for ornamental purposes. The ancients valued it very highly, and used it much for cameos. Many of the finest cameos in existence are of onyx. The name O., however, appears to have been applied by the ancients more extensively than it now is, and even to striped calcareous alabaster, such as is now called Onyx Marble. The *Sardonyx* of the ancients is a variety of O., in which white stripes alternate with stripes of a dark-red variety of carnelian, called *sard* or *sarda*. It is one of the rarest and most beautiful kinds of O., and is more valued than carnelian.

ONYX MARBLE, a very beautiful material, which first came into general notice in this country in 1862, when the French made a large display of it in the International Exhibition. It is a stalagmitic formation, which was discovered by the French in making roads in the province of Oran in Algeria. It is a translucent limestone, containing traces of magnesia and carbonate of iron; its specific gravity is 2.730. The quarries are worked by a company, and the artistic workmen of France are turning it to good account, in the manufacture of very beautiful ornamental works.

OOJEIN. See UJEIN.

O'OLITE (Gr. egg-stone), a variety of limestone, often very pure calcareous spar, distinguished by its peculiar structure, being composed of grains connected together by a calcareous cement; the whole much resembling the roe of a fish. The grains are not unfrequently hollow. Many oolites, as in the south of England, are excellent building-stones. There is no important mineralogical difference between O. and *Pisolite*, or *Pea-stone*. O., as a geological term, is extended far beyond its mineralogical and original signification.

OOLITE or JURASSIC GROUP (in Geology), an extensive and important series of strata of Secondary age, underlying the Chalk formation, and resting on the Trias. In Britain they received the name Oolite, because in the district where they were first examined and described by Dr W. Smith, the limestones contained in them had an oolitic structure (see foregoing article). The name Jurassic has been given to them on the continent, because the range of the Jura Mountains in the north-west of Switzerland is almost entirely composed of them. The strata of the group have been arranged in the following order. The maximum thickness of each division is given in feet:

UPPER OOLITE.		Feet.
1. Purbeck Beds,	. . . . .	200
2. Portland B.-ds,	. . . . .	170
3. Kimmeridge Clay,	. . . . .	600
		— 970
MIDDLE OOLITE.		
4. Coral Rag,	. . . . .	190
5. Oxford Clay,	. . . . .	600
		— 790
LOWER OOLITE.		
6. Cornbrash and Forest Marble,	. . . . .	80
7. Great Oolite and Stonefield Slate,	. . . . .	150
8. Fuller's Earth,	. . . . .	150
9. Inferior Oolite,	. . . . .	250
		— 630
LIAS.		
10. Upper Lias,	. . . . .	300
11. Marlstone,	. . . . .	200
12. Lower Lias,	. . . . .	600
		— 1100
Total,		3490

It is apparent from this table that the Oolitic rocks consist of three extensive clay deposits, each of which forms the basis of a smaller and variable set of sands and limestones; the Upper

Oolites resting on the Kimmeridge Clay, the Coral Rag on the Oxford Clay, and the Lower Oolite on the Lias.

1. The Purbeck beds, unlike the other oolitic rocks, are chiefly freshwater deposits. Though lithologically they are very similar throughout, the peculiarities of the contained fossils have caused them to be grouped into three series—the Upper, Middle, and Lower. The Upper Purbecks are purely freshwater, containing beds of limestone and shale, which abound in shells of lake and river mollusca and cyprides. The stone called Purbeck Marble, formerly so extensively used in the ornamental architecture of English churches and other buildings, belongs to this division; it consists of the shells of *Paludine*, held together by a somewhat argillaceous paste. The Middle Purbecks are partly freshwater, and partly brackish or marine. The 'cinder-bed,' composed of a vast accumulation of shells of *Ostrea distorta*, occurs in this section, and near it is the narrow layer from which Mr Beckles recently obtained the remains of several mammalia. The Lower Purbecks are chiefly freshwater, with some intercalated brackish or marine beds, and one or two old vegetable soils called by the quarrymen 'dirt-beds,' which contain the stems of Cycadaceous and Coniferous plants. 2. The Portland beds consist of oolitic and other limestones interstratified with clays, and passing below into sands and sandstones, from which the well-known building-stone is obtained, of which St Paul's and many of the principal buildings in London are built. 3. The Kimmeridge Clay is generally a dark-gray bituminous shale, with intercalated beds of sand, calcareous grit, and layers of septaria. The dark shale in some places passes into an impure brown shaly coal. 4. The Coral Rag contains, as its name implies, an abundance of corals, in bluish limestone beds mixed with layers of calcareous grit. The Solenhofen lithographic stone, with its beautifully preserved and varied fossil remains, belongs to this division. 5. The Oxford Clay is a dark-blue or blackish clay without corals, but having a large number of beautifully preserved Ammonites and Belemnites. Beds of calcareous sandstone, called Kelloway Rock, occur in its lower portion. 6. The Cornbrash consists of thin beds of cream-coloured limestone, with sandstones and clays, and the Forest Marble (so named from Wychwood Forest) is composed of an argillaceous limestone, with numerous marine fossils, blue marls and shales, and yellow silicious sand. At Bradford, Wiltshire, the Forest Marble is replaced by a considerable thickness of blue unctuous clay. 7. The Great Oolite is composed of shelly limestones, sandstones, and shelly calcareous sandstones, and the Stonesfield Slate is a slightly oolitic shelly limestone, which splits into very thin slabs, erroneously called 'slates;' it is remarkable for the remains of terrestrial reptiles and mammals found in it. The Bath Oolite, a celebrated building-stone, belongs to this division. 8. The Fuller's Earth group is a local deposit found near Bath; it consists of a series of blue and yellow shales and marls, some of which have properties fitting them for the use of the fuller. 9. The Inferior Oolite is composed of a series of beds of pisolitic and shelly limestones, brown marl, and brown sandy limestone, all abounding in fossils. 10. The Lias (q. v.) is a great clay deposit. It is divided into the Upper and Lower Lias, which consist of thin beds of limestone scattered through a great thickness of blue clay, and, separating these two groups, the Marlstone, or calcareous or ferruginous sandstone. The Lias abounds in beautifully preserved fossils.

The oolite occupies, in England, a zone nearly

thirty miles in breadth, extending across the country from Yorkshire to Dorsetshire. In Scotland, patches of Lias and Oxford clay occur in the islands of Mull and Skye, and on the western shores of the mainland, and beds belonging to the lower oolite are found at Brora, on the east coast of Sutherland, which contain an impure coal. The only oolite rocks in Ireland are a few isolated patches in Antrim, which abound with the fossils of the lower Lias. On the continent, rocks of this age occur in Germany and France, but they have been most extensively studied in the Jura Mountains, which, though having a height of 6000 feet, are entirely composed of oolite and cretaceous rocks. The strata are greatly bent and contorted, and as they approach the Swiss Alps, the great mass of which is also formed of oolite, they become completely metamorphosed into clay slates, mica schists, gneiss, and crystalline limestones. Beds of oolite have been noticed in Cutch, in India. In Australia similar beds occur on the western coast, and probably some of the coal-beds of New South Wales, Victoria, and Tasmania belong to the oolite. In both North and South America, fossils, apparently of oolitic age, have been found; but these deposits require to be more exactly examined.

The oolite is remarkable for the abundance of its fossils, and is in this respect in striking contrast to the immediately preceding Triassic and Permian periods. The several freshwater deposits, and the ancient vegetable surfaces, contain the remains of a considerable number of plants. Ferns still abound, and with them are associated species that are evidently related to the living genera *Cupressus*, *Araucaria*, and *Zamia*.

Corals abound in several of the beds. The brachiopods are the only division of the mollusca that is not largely represented. The conchifers and gasteropods shew a great number and variety of new genera, which are nearer the forms of the present day than those that preceded them. But the remarkable feature of molluscan life is the enormous development of the cephalopoda. Whole beds are almost entirely made up of their shells. No less than 600 species of ammonites have been described, chiefly from the rocks of this period, and the belemnites were also very numerous. The crinoids have become scarce, but are replaced by star-fishes and sea-urchins. The freshwater beds contain the remains of many insect forms. The heterocercal-tailed fish give way to the more modern homocercals, and the true sharks and rays make their appearance, though the old cestracions are still represented by some survivors. The characteristic feature of the oolitic period was its reptiles. The land, the sea, and the air had each their fitting inhabitants of this class. The various species of pterodactyles, some not larger than the bat, others surpassing, in the stretch of their membranous 'wing,' the size of the largest living bird, were the terrors of the air; while their allies, the monster ichthyosaurs and plesiosaurs, held the mastery of the waters; and the huge megalosaurs, some not less than 30 feet in length, trod the earth. The few mammalian remains hitherto found, have a special interest from their antiquity, being the first evidence of this high order of animals on the globe. They belong, apparently, to marsupial animals; one species is, however, supposed by Owen to have been a hoofed and herbivorous placental mammal.

OONALA'SKA. See UNALASKA.

OORAL'SK. See URALSK.

OO'RFA. See URFA.

OO'RG. See URG.

OORI or LIMPOPO RIVER, an important river system of South-Eastern Africa, rising in lat. 26° S. in the high plateau called the Magaliesberg, which bounds the basin of the Orange River to the north, and with its different branches, the Marique, Ngotwane, Lipalula, &c., draining the regions now known as the Transvaal Republic. Flowing first to the north, the O. gradually turns to the east, and is supposed to reach the Indian Ocean at Imbambane, in lat. 24°, after a course of 950 miles, and draining a basin of not less than 250,000 square miles, yet, like other South African rivers, it is not navigable, and the very position of its embouchure is not yet very satisfactorily ascertained. The basin of this river occupies the depression which exists between the watershed of the Orange River on the south, and the south tributaries of the Zambesi on the north.

OOROOMFYAH, town and lake. See **UKMYAH**.

OOSTERHOUT, a flourishing town in the Netherlands, province of North Brabant, six miles north-north-east from Breda, is situated in a well-wooded, fertile district of country. Pop. (1863) 8844, of whom 8457 belonged to the Roman Catholic Church. Much business is done in the grain and cattle markets. There are 14 tanyards, several flourishing beer-brewing establishments, 5 potteries, and 4 brick-works. O. has a grammar-school, and a sunnery, the inmates of which employ themselves in teaching the children of the poor. The handsome town-house and great Roman Catholic Church stand on the market-place, which is shaded with linden-trees.

Near O. is an extensive wood, where are the ruins of the house of Stryen or Oosterhout, formerly the residence of the Counts of Stryen, under whose jurisdiction were not only the town and barony of Breda, but also the marquise of Bergen-op-Zoom.

OOTACAMUND, the chief town in the Neilgherry Hills, and the great sanitarium of Southern India. These hills are situated between 11°—12° N. lat. and 76°—77° E. long. The elevation of O. is 7400 feet above the sea; the mean temperature being about 49°, the maximum 77°, and the minimum 33°. The average rainfall is 45 inches. Its distance is only about 350 miles from Madras, and it is easy of access, as the railway now conveys the traveller to the foot of the Hills. The other stations on the Neilgherries are Coonoor, Kottagherry, and Jackatalla, or Wellington. In the last place, there is a fine range of barracks for European troops. The number of European settlers on these hills is increasing. There are thriving plantations of tea and coffee, and the cinchona or quinine plant.

OPAH, or KING-FISH (*Lampris guttatus* or *L. bowi*), a fish of the Dory (q. v.) family (*Zedæ*), occasionally found in the British seas, but more common in more northern regions, and found not only in the Atlantic and Arctic Oceans, but also in the Pacific, as on the coasts of China and Japan. It is of an oval form, greatly compressed, with small thin scales, the mouth small and destitute of teeth, a single dorsal fin much elevated in front and extending almost to the tail. This fish attains a large size, being sometimes five feet long and 150 pounds in weight. It is brilliantly coloured; the upper part of the back and sides rich green, reflecting purple and gold in different lights, the lower parts yellowish-green, round yellowish-white spots above and below the lateral line; all the fins bright vermilion. The flesh is much esteemed; it is red like salmon, and is said to resemble it in flavour.

O'PAL, a mineral which differs from quartz in containing from 5 to 13 per cent. of water, its only other essential constituent being silica, although a little alumina, oxide of iron, &c., is often present. It is never found crystallised, and does not exhibit a crystalline structure like quartz. It has a conchoidal fracture, and is very easily broken. There are many varieties, which pass into one another, so that their precise limits cannot be defined, from which has arisen no little confusion of names. The finest kind is called *Precious O.* or *Noble O.*, and sometimes *Oriental Opal*. It is semitransparent or translucent, usually of a bluish or yellowish white colour, yellow by transmitted light, and exhibits a beautiful play of brilliant colours, owing to minute fissures which refract the light. It is much valued for setting in rings, brooches, &c., and is polished with a convex surface, never cut into facets, both because of its brittleness, and because its play of colours is thus best exhibited. The ancients valued opals very highly. The Roman senator Nonius preferred exile to giving up an O. to Mark Antony. This O. was still to be seen in the days of Pliny, who ascribes to it a value equal to more than £100,000 sterling. The imperial cabinet of Vienna contains the most celebrated O. now known to exist. It is five inches by two inches and a half. The finest opals are almost all brought from Kaschan in Hungary, where they are found disseminated in a trachytic conglomerate. They are mostly very small, but even a very small O., if really beautiful, is worth four or five pounds; and the price increases very rapidly with increase of size. *Precious O.* is found also in Saxony, in South America, &c. When the colours are not equally diffused, but in detached spots, jewellers call it *Harlequin Opal*. There is a dark or blackish variety, apparently tinged by oxide of iron, which occasionally exhibits very beautiful reflections, and is then much prized. *Girasol* (q. v.) and *Cacholong* (q. v.) are varieties of opal. What lapidaries call *Prime d'Opal* is clay-porphry, or other stone containing many small grains of opal. It is cut into slabs, and made into boxes and other ornamental articles; the stone which contains the opals being often artificially blackened by boiling in oil, and afterwards exposing to a moderate heat.—*Common O.* is semitransparent, white, yellow, green, red, or brown, and does not exhibit any play of colours. It is not a rare mineral, and is chiefly found in clay-porphry. *Semi-opal* is more opaque. *Wood O.* is a petrification, and exhibits the form and structure of wood, the place of which has been taken by the siliceous mineral. *Hyakite* and *Menilite* are varieties of opal.

OPEN-BILL (*Anastomus*), a genus of birds of the Heron family (*Ardeide*), natives of the East Indies and of Africa, remarkable for the structure of the bill, the mandibles being in contact only at the base and tip, with a wide interval between their edges in the middle. They frequent the sea-coast and rivers, and prey on fish and reptiles. One species is well known in India as the Coromandel Heron.

OPEN DOORS, LETTERS OF, in Scotch Law, mean a writ authorising a messenger to poind or seize goods deposited in lockfast-places, and to break open the locked doors in order to effect the seizure. See **HOUSE**.

O'PERA, a musical drama, in which music forms an essential part, and not a mere accessory accompaniment. As in the higher drama, poetry supercedes the prose of ordinary life, so in the opera, with perhaps as great artistic right, the language of music is introduced at a considerable sacrifice of probability. The libretto or words are, in the

modern opera, a peg on which to hang the music, rather than the music an accessory to the written drama. The component parts of an opera are recitatives, duets, trios, quartets, choruses, and finales, accompanied throughout by an orchestra, and the whole is preceded by an instrumental Overture (q. v.). Recitative is declamation, which, in its succession of musical sounds and rhythm, strives to assimilate itself as much as possible to the accents of speech, and therefore does not entirely conform to musical rhythm. The accessories of scenic representation are also present, and a Ballet (q. v.) is also frequently introduced. In some of the German operas, and in the French *opéra comique*, spoken dialogue without music takes the place of recitative. Among the different varieties of the opera enumerated are the great opera or *opera seria*, of a dignified character; the romantic opera, embracing an admixture of the grave and lively; the comic opera, or *opera buffa*; as well as many intermediate varieties.

The idea of the opera may in part have arisen from the Greek drama, which possessed, to a considerable extent, the operatic character: the choral parts were sung, and the dialogue was delivered in a sustained key, probably resembling operatic recitative more than ordinary speech. The earliest extant example of any composition resembling the lyric drama of the moderns is Adam de la Halle's comic opera of *Li gieu (le jeu) de Robin et de Marian*, composed in the 13th c., the music of which is wonderful for its date. The next appearance of anything like opera is in the 16th century, when various musical dramas were composed in the madrigalesque style. An opera composed by Zarlino is said to have been performed at Venice when Henry III. passed through that city on his way from Poland to France. About the same time, a pastoral called *Dafne*, written by the poet Rinucci, was set to music by Peri; and the same poet and musician conjointly produced the lyric tragedy of *La Morte di Euridice*, which was represented at the theatre of Florence in 1600. Claudio Monteverde, one of a society of amateurs, known as the 'Florentine Academy,' who devoted themselves avowedly to the study and revival of Greek music, soon afterwards produced his *Orfeo*, a 'favola di musica,' in whose performance an orchestra of no fewer than 36 performers was called into requisition, most of the instruments being, however, only used in twos or threes, and never more than ten at a time. From these beginnings, the opera advanced into one of the permanent institutions of Italy—a development of music at first strongly opposed in character and style to the music of the church. With the progress of music, and the perfecting of the musical instruments which went to form the orchestra, the lyric drama began, towards the middle of last century, to approach its present character. Of the innumerable Italian operas of last century, only Cimarosa's *Matrimonio Segreto* retains its place on the stage. Cherubini, the first of the more modern school, after producing his *Quinto Fabio* at Milan, became naturalised in France: Rossini, who succeeded him in Italy, is the greatest name in the Italian opera. Nothing can exceed the deliciously fresh character of the best known operas of this now aged musician, *Il Barbiere di Siviglia*, *Otello*, *La Gazza Ladra*, *Semiramide*, and *Guillaume Tell*. Next to them rank the equally well-known works of Bellini, *Norma*, *La Sonnambula*, and *I Puritani*; *Lucia di Lammermoor*, *Lucrezia Borgia*, and *L'Elisir d'Amore*, the three *chefs-d'œuvre* of Donizetti, alone rivalling them in public estimation. A newer school of opera has recently sprung up in Italy, more grand if less fresh, of which the chief

master is Verdi, whose *Ernani*, *Nabuchodonosor*, *I Lombardi*, *Otello*, *Rigoletto*, *Il Trovatore*, *La Traviata*, and others have attained immense popularity in Italy, and wherever the Italian opera has been naturalised.

From Italy the opera was introduced into Germany, where, more scientific and less sensuous than in Italy, it flourished in opposition to national as well as ecclesiastical music. Germany divides with Italy the honour of perfecting orchestral music and the opera. Glück, educated in Italy, produced his *Orfeo* in Vienna, and then went to Paris, where the French adopted him as we did Handel. Mozart was the first composer of operas for the modern orchestra; *Idomeneo*, *Il Seraglio*, *Le Nozze di Figaro*, *Don Giovanni*, and *Zauberflöte* are his principal operatic works, unsurpassed by anything that has succeeded them. The most important German operas composed since their date are *Fidelio* by Beethoven; *Der Freischütz*, *Euryanthe*, and *Oberon* by Weber; *Faust* by Spohr; and the gorgeous operas of Meyerbeer, *Robert le Diable*, *Les Huguenots*, and *Le Prophète*, and *L'Étoile du Nord*. *Les Huguenots*, notwithstanding its involving enormous difficulties in representation, keeps its place in every operatic theatre in Europe. Wagner, the chief exponent of a more recent school arrogating to itself the title of the 'music of the future,' or rather 'work of art of the future,' has produced the opera of *Tannhäuser*, which enjoys at present a large share of public favour in Germany.

In France, the earliest operatic representation of which we have any record was in 1582. About 1669, the Abbot Perrin obtained from Louis XIV. the privilege of establishing an opera in the French language at Paris, and in 1672 the privilege was transferred to Lulli, who may be considered the founder of the French lyrical drama. Lulli's popularity continued during a long period, and was only put an end to by the rise of the German Glück, who, naturalised in Paris, produced there his *Iphigénie en Aulide* and *Alceste*. It is greatly through Glück's influence that the modern French opera has become what it is, a composite work combining French, German, and Italian elements. Its best-known productions include Méhul's *Joseph*, Halévy's *Juive*, Auber's *Maître Nilou*, *Fra Diavolo*, and *Diamant de la Couronne*, and Gounod's recent opera of *Faust*. The Italian opera, introduced in Paris in 1646 by Cardinal Mazarin, and superseded in 1670, was revived in the beginning of the present century, and has since flourished side by side with the national opera of France.

The possibility of a national English opera seems first to have been shewn by Purcell, who, through Humphreys, had learned much from Lulli. His music to Dryden's *King Arthur* is very beautiful, though kept throughout subordinate to the business of the drama. *The Beggar's Opera*, as set to music by Dr Pepusch, was a selection of the airs most popular at the time. It has retained its place on the stage, as also has Dr Arne's *Artaxerxes*, a translation from Metastasio adapted to music rich in melody. The importation of the Italian opera put a stop, for a time at least, to the further development of an opera in England. In 1706, *Arminio*, with English words adapted to Italian airs, was performed at Drury Lane. In 1710, *Almahide*, wholly in Italian, was performed exclusively by Italian singers at the Haymarket Theatre; and a succession of attempts of the kind ended in the permanent establishment of the Italian opera. The arrival of Handel in England decided the future progress of the opera. That great master was during the greater part of his life an opera composer and opera manager. He composed for the London stage no fewer than 44

opera, German, Italian, and English. These now forgotten operas were of course not the complex compositions of a later period, which could not have been performed in the then imperfect state of orchestral instruments. A recitative was set to music nearly as fast as the composer could put notes on paper, and the songs were accompanied in general by only one violin and bass, the composer sitting at the harpsichord, and supplying what was wanting. From Handel's time onwards, the opera flourished as an exotic in Britain, the singers being foreign, and the works performed being either Italian or occasionally German or French. Attempts crowned with some measure of success have latterly been made to establish an opera of a national character in England. Balfe's *Bohemian Girl* and *Rose of Castile*, are the best works which this school has produced, and have attained with other operas by Balfe, Wallace, and Macfarren, a considerable measure of popularity. See Hogarth's *Memoirs of the Opera* (London, 1851).

OPERA-GLASS (Fr. *lorgnette*, Ger. *theater-periscope*). This is a double telescope, which is used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers of a theatre or opera, &c. It is from its use at an opera that it derives its name. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from 2 to 3 at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasing picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally shew a highly magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut, a somewhat unnatural way of looking, and of seeing things stand out stereoscopically as in ordinary vision. The opera-glass is in consequence the most popular of telescopes, and requires almost no art in its use.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object lens, and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another. Fig. 1 represents the action of the telescope; o is the object-lens, and e the eye-lens, and oe is the axis of the instrument. The object-lens would form

is the same as the angle aob ; and either of these angles gives half the angle under which the object is seen to the unaided eye. The three extreme rays, r, r, r , of the pencil appear in the figure nearly parallel, although they come from a point. The object is at a considerable distance from the object-glass or eye, so that it is not possible in so limited a figure to shew their divergence. After passing through the object-lens, the three rays proceed to the point b , in the image which the object-lens would form at cab , if no eye-lens were there. This image, as shewn in the figure, is inverted, and would be seen as such if the eye were placed about ten inches (the distance of distinct vision) behind it. The three rays in question do not reach the point b in consequence of the eye-lens intervening, and their course onwards to that point, after passing the eye-lens, is shewn by dotted lines. The actual course, after passing the second lens, is shewn again by the full lines, r, r, r , which to the eye placed immediately behind the eye-lens appear to proceed from the point B in front. As the light comes from B in the same direction as it comes from the actual point in the object, the image is erect. What holds for the point B , holds for every point in the image and object. To find the magnifying power, it is necessary to join Be and Ce , and produce the lines thus formed to b and c . As the eye is placed immediately behind the eye-lens, the angle under which the magnified object is seen is the angle BeC , which is equal to ceb . Now, the angle under which the object itself is seen at o or at e —for the slight difference has no effect at the distance at which objects require to be seen by a telescope—is twice the angle roA , or which is the same thing, the angle cob . The ratio of the angle ceb to the angle cob , which is the magnifying power, is easily seen to be the same as that of the line oe to the line ae . But oe is the focal length of the object-glass, and ae is the focal length of the eye-glass, so that the magnifying power of the instrument is the number of times the focal length of the eye-glass is contained in that of the object-glass. The longer, therefore, the focal length of the object-lens, or the shorter the focal length of the eye-lens, the greater the magnifying power. This may be practically expressed thus: the flatter the object-lens, and the hollower the eye-lens, the more are objects magnified by the glass. The magnifying power may be found with sufficient accuracy by looking at an object with one eye through the tube and the other eye unaided, and so handling the glass that the magnified image seen by the one eye is superposed on the object seen by the naked eye, when a comparison of their relative sizes can be easily made. For great magnification, the instrument requires to be greatly lengthened—a condition inconsistent with its use as an opera-glass. In addition, a high magnifying power is attended with the disadvantage that the field of view, or amount of object or objects seen, becomes too limited. On screwing out the instrument, it will be seen that objects increase in size as the instrument is lengthened, but that the picture becomes more and more limited, shewing that a large power and a large field are incompatible. The opera-glass need not be set to the same precise point as is necessary with ordinary terrestrial telescopes, as the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence, caused by screwing the opera-glass out or in, is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a

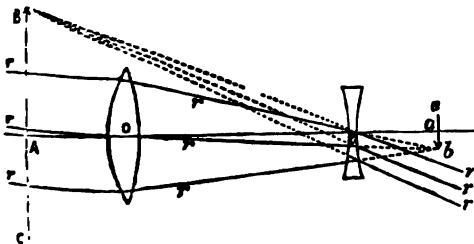


Fig. 1.

an image, cab , of the object looked at at or near its focus, but the eye-lens intervening, converts the light converging to cab to light diverging apparently from an object in front, CAB . To shew more clearly the changes which the light undergoes, the course of a pencil of rays proceeding from the top of an object is traced. The ray proceeding from the top of the object to the centre of the lens, a , makes an angle, roA , with the axis. This

particular point at which an object at a certain distance is best seen.

Fig. 2 gives a section of the opera-glass, which is sufficiently simple to require no further description. The two telescopes are identical in construction,

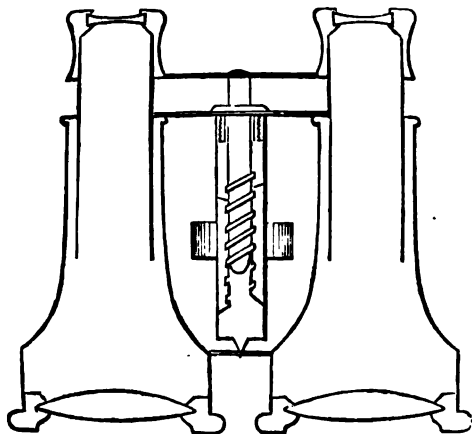


Fig. 2.

and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. Opera-glasses have now come into such demand, that they form an important article of manufacture, of which Paris is the great seat. So largely and cheaply are they produced in Paris, that it has nearly a monopoly of the trade. They may be had from 2s. 6d. to £6 or £7. The cheapest opera-glasses consist of single lenses, those of the better class have compound achromatic lens. A very ordinary construction for a medium price is to have an achromatic object-lens, consisting of two lenses and a single eye-lens. In the finest class of opera-glasses, which are called *field-glasses*, both eye-lenses and object-lenses are achromatic. Plüßl's celebrated field-glasses (Ger. *Feldstecher*) have twelve lenses, each object-lens and eye-lens being composed of three separate lenses.

OPERCULUM (Lat. a lid), a term used in botany chiefly to designate the lid or covering of the mouth of the urn or capsule (*Ureca*) which contains the spores of mosses. Before the ripening of the spores, the operculum is generally concealed by the *calyptra*; but after the calyptra has been thrown off, the operculum itself also generally falls off, leaving the peristome visible, and the mouth of the urn open. In some cases the operculum does not fall off, and the urn opens by valves.

In Zoology, the term operculum is chiefly employed to denote the covering which many gasteropod molluscs form for the mouth of their shell. It is attached to the back of the foot of the mollusc. In some it is calcareous, forming a shelly plate; in some it is horny; whilst gasteropods very nearly allied to those which possess it, are destitute of it altogether. The operculum increases in various ways, so as to present in different genera great diversity of structure, concentric, spiral, unguiculate, &c.

OPHICEPHALUS, a genus of fishes, of the family *Anabastidae* (q. v.), sometimes regarded as constituting a distinct family *Ophicephalidae*, because there is a mere cavity for retaining water to supply the gills, and no pharyngeal lamina, and because of the long eel-like form and the flattened head, which is covered with large scales. Some of them are common in the fresh waters of the East Indies, are

often found among wet grass, often travel from one pool to another, and are capable of subsisting for a long time in half-dried mud, descending into it when the pools dry up. The *CORA-MOTA* or *GACHUA* of India (*O. gachua*) is much used for food by the natives, although generally rejected by Europeans on account of its very snake-like appearance. It is very tenacious of life, and is not only brought to the Indian markets alive, but is cut to pieces whilst still living for the convenience of buyers.

O'PHICLEIDE (Gr. *ophis*, serpent, and *kleis*, key), a musical wind-instrument of brass or copper, invented to supersede the Serpent (q. v.) in the orchestra and military bands. It consists of a conical tube, terminating in a bell like that of the horn, with a mouthpiece similar to that of the serpent, and ten ventages or holes, all stopped by keys like those of the bassoon, but of larger size. Ophicleides are of two kinds, the bass and the alto. The bass ophicleide offers great resources for maintaining the low part of masses of harmony. Music for it is written in the bass clef, and the compass of the instrument is from B, the third space below the bass staff, to C, the fifth added space above it,



including all the intervening chromatic intervals. The alto ophicleide is an instrument of very inferior quality, and less used. Its compass is also three octaves and one note. The music for it is written in the treble clef, and an octave higher than it is played. Double bass or monster ophicleides have sometimes been used in large orchestras, but the amount of breath which is required to play them has prevented their coming into general use.

OPHIDIA. See **SERPENTS.**

OPHIOGLOSSÆ, a suborder of *Filices* or Ferns (q. v.), consisting of a few rather elegant little plants with an erect or pendulous stem, which has a cavity instead of pith, leaves with netted veins, and the spore-cases (*thece*) collected into a spike formed at the edges of an altered leaf, 2-valved, and without any trace of an elastic ring. They are found in warm and temperate countries, but abound most of all in the islands of tropical Asia. Several species are European, and two are British, the *Botrychium* (q. v.) *lunaria*, or Moonwort, and the Common Adder's-tongue (*Ophio-glossum vulgatum*), which was at one time supposed



Ophicleide.



Adder's-Tongue (*Ophio-glossum vulgatum*).

to possess magical virtues, and was also used as a vulnerary, although it seems to possess only a mucilaginous quality; on account of which some of the other species have been employed in broths. It is a very common plant in England, its abundance in some places much injuring pastures.

OPHIR, a region frequently mentioned in the Old Testament, and from which the ships of Solomon fitted out in the harbours of Edom, brought gold, precious stones, sandal-wood, &c. The voyage occupied three years. Where Ophir was situated, has been a much, in fact, a superfluously disputed question. It was probably either on the east coast of Africa about Sofala, or in Arabia, or in India, but in which of the three countries is doubtful. Huet, Bruce (the traveller), the historian Robertson, M. Quatremère, &c., are in favour of Africa; Michaelis, Niebuhr (the traveller), Gosellin, Vincent, Winer, Furst, Knobel, Forster, Crawford, and Kalisch, of Arabia; Vitrings, Reland, Lassen, Ritter, Bertheau, and Ewald, of India. Josephus, however, it should be said, placed O. in the peninsula of Malacca, and his very respectable opinion has been adopted by Sir J. Emerson Tennent in his work on Ceylon. For a complete discussion of the point, see Karl Ritter's *Erdbunde* (vol. xiv. 1848), 80 octavo pages of which are devoted to Ophir. According to Ritter, who accepts the view of Lassen, O. was situated at the mouth of the Indus.

OPHIR, called by the Malays, Gunong Pasaman, a volcanic mountain in the highlands of Padang, island of Sumatra, lies in 0° 4' 58" N. lat., and 99° 55' E. long.; the eastern peak, called Telaman, attains the height of 9939 feet above the sea. The western peak is called Pasaman. The numerous inhabitants have cleared off forest and brought under cultivation large tracts of land on the slopes of O., and its base is studded with villages. The O. districts are most beautiful, and the lofty waterfalls, contrasting with the bright-green foliage of the mountain, highly picturesque.

OPHISURUS. See SNAKE-BEL.

OPHITES (Gr. *ophitai*, 'serpent-brethren,' from *ophis*, a serpent), a sect of Gnostics (q. v.), who while they shared the general belief of dualism, the conflict of matter and spirit, the emanations, the Demiurges, and other notions common to the many subdivisions of this extraordinary school, were distinguished from all by their peculiar doctrine and worship connected with their *ophis* or serpent. The O. like most other Gnostics, regarded the Demiurge, or the Jehovah of the Old Testament, with great abhorrence, but they pursued this notion into a very curious development. Regarding the emancipation of man from the power and control of the Demiurge as a most important end, they considered the serpent who tempted Eve, and introduced into the world 'knowledge' and revolt against Jehovah, to have been the great benefactor of the human race. Hence their worship of the serpent. Some of the details of their system were very strange. We may instance their singular attempt to engraft 'Ophism' on Christianity; their seeking, as it were, to impart to the Christian Eucharist an Ophite character, by causing the bread designed for the Eucharistic sacrifice to be *licked by a serpent*, which was kept in a cave for the purpose, and which the communicants kissed after receiving the Eucharist (*Epiph. Hor.* 37, s. 5). Our information, however, regarding them is very meagre, and comes chiefly from antagonistic sources. The O. originated in Egypt, probably from some relation to the Egyptian serpent-worship, and spread thence into Syria and Asia Minor.

Offshoots of this sect are the Cainites. See CAIN and SETHITES.

OPHTHALMIA (derived from the Greek word *ophthalmos*, the eye) was originally and still is sometimes used to denote inflammation of the eye generally, but it is at the present time usually restricted to designate inflammatory affections of the mucous coat of the eye, termed the *conjunctiva*.

There are several important and distinct varieties of ophthalmia (in the restricted sense of the word) which require special notice.

Catarrhal Ophthalmia.—Its leading symptoms are redness of the surface of the eye (the redness being superficial, of a bright scarlet colour, and usually diffused in patches), sensations of uneasiness, stiffness and dryness, with slight pain, especially when the eye is exposed to the light; an increased discharge, not of tears, except at the beginning of the attack, but of mucus, which at first is thin, but soon becomes opaque, yellow, and thicker; pus (or matter, as it is popularly termed) being seen at the corner of the eye, or between the eyelashes along the edges of the lids, which it glues together during the night. The disease results in most cases from exposure to cold and damp, and is very apt to be excited by exposure to a draught of air, especially during sleep. It is popularly known as a *cold* or a *blight* in the eye. With regard to treatment, the patient should remain in rooms of a uniform temperature, and should at once take about five grains of calomel, followed by a black draught. The eye should be frequently bathed with poppy decoction, lukewarm or cold as the patient prefers. If the affection does not readily yield to these measures, a drop of a solution of nitrate of silver (four grains of the nitrate to an ounce of distilled water) should be let fall into the eye twice or thrice a day. It usually causes a smarting sensation for about ten minutes, after which the eye feels much easier than it did before the drop was applied. The adhesion of the eyelids in the morning may be avoided by smearing their edges at bedtime with a little spermaceti ointment.

Purulent ophthalmia differs from catarrhal ophthalmia in the severity of its symptoms, and in its exciting causes. It is a violent form of inflammation of the conjunctiva; is accompanied with a thick purulent discharge on the first or second day of its commencement, and is very apt to occasion loss of vision. There are three remarkable varieties of this affection, called respectively (1) purulent ophthalmia of adults, or Egyptian ophthalmia, or contagious ophthalmia; (2) gonorrhoeal ophthalmia; and (3) purulent ophthalmia of newly-born children. (1) *Purulent ophthalmia of adults* begins with the same symptoms as catarrhal ophthalmia, but in a very exaggerated form. The conjunctiva rapidly becomes intensely red, and soon appears raised from the sclerotic by the effusion of serum between them, projecting around the cornea, which remains buried, as it were, in a pit. Similar effusion takes place beneath the mucous membrane lining the eyelids, causing them to project forwards in large livid convex masses, which often entirely conceal the globe of the eye. These symptoms are accompanied by severe burning pain, great headache, fever, and prostration. When the disease is unchecked, it is liable to produce ulceration or sloughing of the cornea, with the escape of the aqueous humour and protrusion of the iris; and even when these results do not follow, vision is often destroyed by permanent opacity of the cornea. It is a common disease in India, Persia, and Egypt; and in consequence of its having been imported from the last-named country into England by our troops in the beginning of the present century, it got the name of

Egyptian ophthalmia. Some idea of its prevalence and of its danger may be formed from the facts (1) that two-thirds of the French army in Egypt were labouring under it at the same time, and (2) that in the military hospitals at Chelsea and Kilmainham there were, in December 1810, no fewer than 2317 soldiers who had lost the sight of both eyes from this disease. Until after the war in Egypt, the disease was unknown in Europe. Since that time it has not unfrequently broken out in this country—not only among troops, but in schools, asylums, &c. The disease is unquestionably contagious, but there are good reasons for believing that it often arises, independently of contagion, from severe catarrhal ophthalmia under unfavourable atmospheric and other conditions; and that having so originated, it possesses contagious properties. *Gonorrheal ophthalmia* arises from the application of gonorrheal discharge or matter to the surface of the eye; and hence is most common in persons suffering from the disease from which this variety obtains its specific name. It is, moreover, not unfrequently occasioned by the common but disgusting practice, adopted by the poorer classes, of bathing the eyes in human urine, under the idea that by this procedure they strengthen the sight. In its symptoms, it is almost identical with ordinary purulent ophthalmia. The *purulent ophthalmia of children* usually begins to appear about the third day after birth. It is a very common affection, and its importance is apt to be overlooked until it has made considerable progress. If the edges of the lids appear red and glued together, and if the eye, when the lids are separated, shews redness and swelling of the conjunctiva, there is no doubt of the nature of the disease, which, if not checked, progresses in much the same way as in adults. It is, however, much more amenable to treatment, and with proper care the sense of sight is seldom impaired, provided the disease has not extended to the cornea before medical aid is sought. Of the treatment of purulent ophthalmia in these various forms, we shall say nothing more than that it must be left exclusively to the medical practitioner, whose advice should be sought as soon as there is the slightest suspicion of the nature of the case.

There is one more form of this disease which is of very common occurrence, and has received the various names of *strumous* (or *scrofulous*), *pustular*, and *phlyctenular ophthalmia*. It is intimately connected with the scrofulous constitution, and is most prevalent in children from four to ten or twelve years of age. The most prominent symptom is extreme intolerance of light, the lids being kept spasmodically closed. When they are forcibly separated, a slight vascularity, usually stopping at the edge of the cornea, is observed, and at or about the line of separation between the cornea and sclerotic small opaque pimples or pustules appear. The treatment consists (1) in improving the general health by due attention to the secretions, and the subsequent administration of tonics (such as quinia and cod-liver oil), and change of air; and (2) in local applications, such as solution of nitrate of silver, or wine of opium, dropped into the eye, or stimulating ointments (such as dilute citrine ointment) smeared over the edges of the lids at bedtime. This form of disease, being dependent on constitutional causes, is often very obstinate, and is always liable to recur. It is not unfrequently attended with the annoying complication of a skin disease, known as *crusta lactea*, on the cheeks, in consequence of the irritation caused by the flow of scalding tears. The crusts or scabs are easily removed by a poultice or warm-water dressing, after which the part must be bathed by a lotion, consisting of a drachm of

oxide of zinc in four ounces of either pump or rose water.

OPHTHALMOSCOPE, THE, is an instrument recently invented for the purpose of examining the deep-seated structures of the eye, and for detecting disease in them. In its simplest form, it is merely a concave circular mirror, of about ten inches focus, made of silvered glass or polished steel, and having a hole in the centre; and with it there is supplied, as a separate piece of apparatus, a convex lens an inch and a half in diameter, with a focal length of about two and a half inches, set in a common eye-glass frame, with a handle three inches long. The patient (his pupil having been previously dilated by the application of a drop of solution of atropine) is made to sit by a table in a dark room, with a sliding argand lamp placed by the side of his head, with the flame on a level with the eye, from which it is screened by a little flat plate of metal attached to the burner. The following description of the mode of using the instrument, and of the parts brought into view by it, is borrowed from the article on this subject contributed by Mr Haynes Walton to the last edition of Druitt's *Surgeon's Vade Mecum*. 'The operator sits directly in front, and holding the instrument close to his eye, and a little obliquely to catch the light from the lamp, he commences, at the distance of about 18 inches from the patient, to direct the reflection on the eye. When this is got, the convex lens must be held at a distance of two and a half inches from the eye, and the focusing commenced by moving it slowly backwards and forwards. When the light fairly enters the eye, a reddish glare appears; and as it is focused, an orange-red or orange-yellow is seen; then the blood-vessels of the retina come into view. The retina itself presents a whitish aspect, through which the choroid is more or less discernible. The entrance of the optic nerve should now be sought. The way to discern it is to make the patient look inward. It appears as a white circular spot, in the centre of which are the central vein and artery of the retina, giving off six or eight branches.' This optic disc is the most important part to be observed; but a thorough ophthalmoscopic examination will reveal structural differences, not only in it, but in the retina, choroid, and vitreous humour, and will reveal cataract in its early stage. In short, the ophthalmoscope is now as essential in the diagnosis of diseases of the deep-seated parts of the eye as the stethoscope is in the diagnosis of thoracic diseases.

OPIE, JOHN, R.A., was born at the village of St Agnes, seven miles from Truro, Cornwall, in May 1761. His father, a master-carpenter, wished him to follow the same trade, but his bias for art was strong; and his attempts at portrait-painting having attracted the notice of Dr Wolcott, afterwards celebrated as Peter Pindar, he had the advantage of his advice in the practice of the art, and his exertions in procuring him employment. And at length, in 1780, he was taken to London by Dr Wolcott; and immediately came to be acknowledged by the fashionable world as the 'Cornish Wonder.' This tide of good-fortune soon ebbed, but not before O. had realised a moderate competency. The loss of popular favour, however, only served to bring out more strongly those points in O.'s character on which his reputation mainly rests, viz., manly independence and strong love of art. He stooped to no device to retain fashionable patronage, but calmly and unremittently entered on that department of painting which, according to the notions of his time, was the only style of high art, viz., historical or scriptural subjects, executed on a large scale. His pencil was employed by Boydell in his well-meant

OPIMUM.

and when the experiment is conducted on a small scale, only for a few hours daily. This difficulty was much felt in an experiment, otherwise most successful, which was made at Edinburgh, by Mr Young, a surgeon, who about the year 1830 obtained 56 lbs. of opium from one acre of poppies, and sold it at 36s. a lb. It was of excellent quality. His mode of cultivation was similar to that usual in India. The seed being sown in spring on a rich soil, the plants were kept clear of weeds, and when they had flowered and produced capsules, incisions were made in the capsules, and the exuded juice collected as described below. The capsules vary from the size of a hen's egg to that of the fist. In India, the poppy flowers in the end of January and beginning of February.

The poppy requires for its profitable cultivation a rich soil, and in India is generally sown in the neighbourhood of villages where manure can be easily obtained. The soil ought to be fine and loose when the seed is sown. The subsequent cultivation consists chiefly in thinning and weeding. Irrigation is practised. Mild moist weather, with night-dews, is deemed most favourable during the time of the collection of the opium. Very dry weather diminishes the flow of the juice, and much rain is injurious.

The opium poppy is cultivated for other purposes besides the production of opium, concerning which see POPPY.

Opium, as a commercial article, is of great importance, exceeding indeed that of any other drug in use, and the cultivation of the opium poppy (*Papaver somniferum*) in British India forms a most extensive branch of agriculture, and the collection and preparation of the drug itself employs a large number of persons in the Patna, Malwa, and Benares districts of Bengal. Indeed during the whole existence of the East India Company, the production of this drug was of the first importance; its employment as a habitual narcotic, as well as a medicine amongst all the eastern nations, demands an enormous supply. The seed is sown in India in



Fig. 1.

the beginning of November; it flowers in the end of January, or a little later; and in three or four weeks after, the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. When this is the case, the collectors each take a little iron instrument, called a *nushur* (fig. 1); it is made of three or four small plates of iron, narrow at one end and wider at the other, which is also notched like a saw; with these instruments they wound each full-grown poppy-head (fig. 2) as they make their way through the plants in the field (fig. 3). This is always done early in the morning, before the heat of the sun is felt; during the day the milky juice of the plant oozes out, and early on the following morning it is collected by scraping

Fig. 2.

it off with a kind of scoop, called a *sitoocha*, and transferred to an earthen vessel, called a *kurrace*,

hanging at the side of the collector. When this is full, it is carried home and transferred to a shallow open brass dish, called a *thalice*, and left

Fig. 3.

for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is called *pusservak*, and is very detrimental to the opium unless removed. It now requires daily attendance, and has to be turned frequently, so that the air may dry it equally, until it acquires a tolerable consistency, which requires three or four weeks; it is then packed in small earthen jars, and taken to the *godowns* or factories; here the contents of each jar are turned out and carefully weighed, tested, valued, and credited to the cultivator. The opium is then thrown into vast vats, which hold the accumulations of whole districts, and the mass being kneaded, is again taken out and made into balls or cakes for the market.

This is a very important operation, and is conducted in long rooms, the workmen sitting in rows, carefully watched by the overseers to insure the work being carefully performed. Before each workman (fig. 4) is a tray, and within easy reach is placed the

Fig. 4.

tagar, a tin vessel for holding as much opium as will make three or five balls. On the tray is another basin containing water, and a smaller tray; on this tray stands a brass cup, into which the ball or cake is moulded, also a supply of thin layers of poppy petals, formed by laying them out overlapping each other, and pressing them upon one another; these are prepared by women in the poppy-fields, and with these is a cup filled with a sticky fluid called *icruah*, made from opium of inferior quality. The operator

expression of the countenance is that of deep and perfect repose. As the poisoning advances, the features become ghastly, the pulse feeble and imperceptible, the muscles exceedingly relaxed, and, unless assistance is speedily procured, death ensues. If the person recovers, the insensibility is succeeded by prolonged sleep, which commonly ends in twenty-four or thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food.

2. The *habitual use of opium*, whether the drug be eaten or smoked, is undoubtedly in most cases injurious to the constitution, although probably not to the extent that some eastern travellers assert. Dr Christison, and other physicians of eminence, have shewn that in numerous cases very large quantities of this drug may be regularly taken with impunity; and Dr Chapman (*Elements of Therapeutics*, vol. ii. p. 199) relates two remarkable cases of this kind—one in which a wineglassful of laudanum was taken several times in the twenty-four hours, and another (a case of cancer of the uterus) in which the quantity of laudanum was gradually increased to *three pints* daily, a considerable quantity of solid opium being also taken in the same period.

Opium-smoking is a habit that is chiefly confined to China and the islands of the Indian Archipelago. An extract, called *chandoo*, is made into pills about the size of a pea. The following is the account given by Marsden, in his *History of Sumatra*, of the process employed: 'One of these pills being put into the small tube that projects from the side of the opium pipe, that tube is applied to a lamp, and the pill being lighted is consumed at one whiff or inflation of the lungs, attended with a whistling noise. The smoke is never emitted by the mouth, but usually receives vent through the nostrils.' Although the immoderate practice of opium-smoking is most destructive to those who live in poverty and distress, yet from the evidence of Mr Smith, a surgeon resident at Pulo Penang, and of Dr Eatwell, who passed three years in China, it does not appear that the Chinese in easy circumstances, and who have the comforts of life about them, are materially affected in respect to longevity by addiction to this habit.

3. As the discussion of the physiological action of opium on the different organs would, in its most condensed form, occupy too much space, we shall confine our remarks to the practical conclusions at which physiologists and physicians have arrived respecting the utility and the danger of prescribing this drug in various conditions of the principal vital organs.

a. Cerebro-spinal System.—Under proper regulations it is a remedy which may be used to stimulate the circulation within the cranium, to promote sleep, to diminish abnormal or increased sensibility, and to allay pain generally; while it is contra-indicated in apoplexy, cerebral inflammation, paralysis, and hysteria. Dr Pereira relates a case in which one grain of opium, administered to an hysterical young woman, proved fatal.

b. Digestive System.—'Under proper regulations,' says Pereira, 'opium is an admissible remedy for the following purposes: to diminish excessive hunger; to allay pain, when unaccompanied by inflammation; to diminish the sensibility of the digestive organs in cases of acrid poisoning, and in the passage of biliary calculi; to produce relaxation of the muscular fibres of the alimentary canal in colic, and of the gall-ducts in the passage of calculi, and to diminish excessive secretion from the intestinal canal in diarrhoea;' while it is contra-indicated 'in diminished secretion from the gastro-intestinal membrane, in extreme thirst, in loss of

appetite and weak digestion, in obstinate costiveness, and in diminished excretion of bile.'

c. Vascular System.—In vascular excitement with great diminution of power, as after hemorrhage, opium is often serviceable; but when the pulse is strong as well as quick, or when there is simultaneously a tendency to abnormal sleepiness, it is contra-indicated.

d. Respiratory System.—'Opium, under proper regulations, may be useful to diminish the contractility of the muscles of respiration, or of the muscular fibres of the air-tubes, as in spasmodic asthma; to diminish the sensibility of the bronchia in the second stage of catarrh, and thereby to allay cough by lessening the influence of the cold air; and, lastly, to counteract excessive bronchial secretion;' while it is contra-indicated in difficulty of breathing, arising from a deficient supply of nervous energy, as in apoplectic cases; in cases in which the venous is imperfectly converted into arterial blood; and in the first stage of catarrh and pneumonia, both from its checking secretion, and from its tendency to impede the due arterialisation of the blood.

e. Urinary System.—Opium is a valuable remedy to allay the pain in the kidney and adjacent parts in cases of renal calculi, and also to produce relaxation of the ureters when the calculi are passing along these tubes; it is also of great service in certain forms of irritable bladder.

There can be no doubt that the essential and primary operation of opium is on the nervous system, the other effects being for the most part secondary.

Opium is undoubtedly the most valuable remedy of the whole materia medica. 'For other medicines,' says Dr Pereira, 'we have one or more substitutes; but for opium, none—at least in the large majority of cases in which its peculiar and beneficial influence is required.' We not only exhibit it to mitigate pain, to allay spasm, to promote sleep, to relieve nervous restlessness, to produce perspiration, and to check profuse discharges from the bronchial tubes and intestinal canal; but we also find it capable of relieving some diseases in which none of the above indications can be always distinctly perceived. In combination with tartar emetic, it has been strongly recommended in fever with much cerebral disturbance; in association with calomel, it is the most trustworthy remedy in cases of inflammation of membranous parts; in insanity, its value cannot be overestimated; it is the remedy chiefly trusted to in delirium tremens; it is more serviceable than any other medicine in diabetes; and to conclude with a more common and less serious affection, its efficiency, when administered in small doses (as ten or fifteen drops of laudanum three times a day), in promoting the healing of ulcers in which granulation proceeds too slowly is very marked.

In addition to the solution of Muriate of Morphia (q. v.), which, on the whole, is the best preparation of opium for internal use in the majority of cases, the British pharmacopoeia contains an opium pill (containing one part of opium in five of the pill); a pill of lead and opium (chiefly used in pulmonary hemorrhage); an aromatic powder of chalk and opium (containing one part of opium in forty of the powder); powder of ipecacuan and opium (or Dover's Powder (q. v.), containing one part of opium in ten of the powder); powder of kino and opium (containing one part of opium in twenty of the powder, and, like the aromatic powder, chiefly used in diarrhoea); tincture (see LAUDANUM), and camphorated tincture of opium (commonly known as Paregoric Elixir, and much used in chronic cough—containing two grains of opium in the fluid ounce); in addition to an *anæura*;

a wine (used chiefly as a local application to the eye in cases of ophthalmia); an ointment of galls and opium (used as an external application to piles); and a liniment and a plaster, which are applied to remove local superficial pains.

In a case of poisoning by opium, the first and most essential point is the evacuation of the contents of the stomach. The stomach-pump, if it can be procured, should be employed, and strong coffee should then be pumped into the stomach after the removal of its contents. The next best remedy is an emetic of sulphate of zinc (about a scruple), and if this is not at hand, a dessert-spoonful of flour of mustard, stirred up in a tumbler of warm water, will usually produce the desired effect. The patient must, if possible, be prevented from falling asleep, and for this purpose he should be kept constantly walking between two strong men, while a third person in the rear should, at short intervals, flick him sharply with a rough wet towel, or (if procurable) a good birch rod. Cold water should also be occasionally dashed over the head and chest. In a few apparently hopeless cases, death has been averted by artificial respiration, and by the application of electro-magnetism.

OPOBALSAMUM. See BALSAM and GUM.

OPODELDOC is a popular synonyme for *Soap Liniment* (q. v.). The origin of the term, which was apparently applied by Paracelsus to various forms of liniments or local applications, is not known. The *opo* is the same as the *opo* of *opoponax*, *opobalsamum*, &c., and is doubtless derived from the Greek *ῥπος*, juice. It has been suggested by an eminent Anglo-Saxon scholar that the original word was *opodilla*, and that *doc* or *dock* was added merely as a gloss to *dilla*—a view that is confirmed by the fact, that in *Ælfric's Glossary*, *dilla* (*dilla*) is Englished by *dock*.

OPOPONAX, a gum resin obtained by puncturing the roots of a species of parsnip (*Pastinaca opoponax*). The chief interest in this material is the great importance which the ancient physicians attached to it as an antispasmodic medicine. It was employed by Hippocrates, Theophrastus, and Dioscorides, who have each left descriptions of it. The plant grows generally throughout Southern Europe, and the gum is still collected, but is not much used.

OPORTO (Portug. *O Porto*, the port), a city of Portugal, and, after Lisbon, the most important seaport of the country, in the province of Minho, on the right bank, and two miles from the mouth of the Douro, in lat. 41° 9' N., long. 8° 37' W.; and is 195 miles north-north-east of Lisbon. Though possessing few imposing edifices, the town, seen from a distance with its irregular outline marked with many towers, its whitewashed houses peering among trees and terraced gardens, has a picturesque effect. Its picturesqueness, however, has been secured at the cost to a great extent of comfort, as many of its streets are narrow, dirty, and so steep as to be impassable for carriages. Of the old walls that surrounded the ancient town, remains are still to be seen. The principal street is the *Rua Nova dos Ingleses*, a spacious, handsome, modern thoroughfare, from which a good view of the Bishop's Palace, which seems to be hung high in the air, is obtained. Here is situated one of the finest edifices in O., the English Factory House, a building of white granite with a beautiful façade, and comprising on a magnificent scale all the appurtenances of a club-house, a ball-room, library, refreshment-room, &c. The houses in the *Rua Nova de S. João*, the most regular street in the city, are lofty, and are faced with

gaily painted and gilt balconies. Of the 11 squares, the greatest is the *Praça de S. Ovidio* on a height, the appearance of which is enhanced by beautiful buildings and a terrace, with a fine seaward view, planted with trees. On the high rocks, on the southern bank of the river, stands the convent of *da Serra*, which at one time was extraordinarily rich. The most beautiful of the convents was that of *S. Bento*, now converted into barracks. The cathedral, which must originally have been a noble edifice, out has been infamously modernised, stands near the Bishop's Palace. The *Torre dos Clerigos* (Tower of the Clergy), said to be the highest in Portugal, was built in 1748. Formerly, there were in all 80 convents and chapels in the city. Of existing institutions, there are four hospitals, and numerous educational and benevolent establishments. O. is the principal industrial seat in the country. It carries on manufactures of linen, silk, cotton, and woollen fabrics, cloth of gold, silk and cotton hosiery, lace, buttons, gold and silver wire, cutlery and hardware, excellent furniture, pottery, glass, leather, paper, hats, sails, and the articles required on ship-board. Royal tobacco and soap-works, two iron-foundries, and several sugar-refineries are also in operation. The entrance to the Douro is rendered highly dangerous by a shifting bar of sand; but yet the commercial traffic on the river is considerable. Its imports for 1861, consisting principally of cotton, woollen, iron, and hardware manufactures from England, salt-fish, wheat, rice, hemp, and flax, amounted to £2,029,295; its exports, consisting of port (so called from the name of the town whence shipped) and other wines, oils, sumach, oranges, lemons, &c., amounted to £1,392,050. Pop., including suburbs, about 90,000.

In ancient times, the site of O. was occupied by the harbour-town *Portus Cale*, afterwards *Porto Cale*, from which has been derived the name of the kingdom, Portugal. It was an important city during the supremacy of the Moors, was destroyed in 820 by Almanzor of Cordova, but was restored and peopled by a colony of Gascons and French in 999. It was famous for the strength of its fortifications during the middle ages, its walls being 3000 paces in circumference, 30 feet in height, and flanked with towers. From the 17th to the present century, O. has been the scene of an unusual number of popular insurrections. In 1808, it was taken by the French; but in the following year it was retaken by an Anglo-Portuguese force under Wellington. In 1832, Dom Pedro, the ex-emperor of Brazil, was unsuccessfully besieged for a year in this city by the forces of Dom Miguel.

OPOSSUM (*Didelphis*), a genus of *Marsupialia*, having ten cutting teeth in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side—fifty teeth in all; the tongue bristly; the tail long, prehensile, and in part scaly; the feet plantigrade; five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits; the muzzle long and pointed, the mouth very wide, the ears large and destitute of hair. The unwebbed feet and non-aquatic habits distinguish this genus from *Cheironectes* (q. v.), also belonging to the family *Didelphida*. But the genus *Didelphis* itself is divided by some naturalists into several genera; and there are differences not unimportant, particularly in the well-developed pouch of some species, and the merely rudimentary pouch or abdominal folds of others. All the existing species are American, but fossil species are found in other parts of the world. The opossums were the first marsupial

OPOSSUM—OPTICAL ILLUSION.

animals known, and are noticed as very wonderful creatures by some of the earliest writers on America. Some of the smaller species much resemble rats and mice, except in their long and pointed muzzle; others greatly resemble shrews; the largest known species are scarcely equal in size to a large cat. It is in some of the smaller species that the pouch is rudimentary; all the larger species have a well-developed pouch, in which the young are carried, and to which, even after beginning to venture forth from it, they retreat on the approach of danger. The young of the species which have a merely rudimentary pouch, also remain attached to the nipple of the mother for a time; and afterwards for a time are carried on her back, intertwining their prehensile tails with hers, and clinging to the fur of her back.—The VIRGINIAN O. (*D. Virginiana*) is one of the largest species. It abounds in the warmer parts of North America, and

marshy places, and feeds much on crabs. The smaller species are numerous in the tropical parts of America.—The name O. is often given in Australia to the Phalangists (q. v.).

O'PPELN, a town of Prussian Silesia, capital of the government district of the same name, on the Oder, 51 miles south-east of Breslau. Since 1816, when it was erected into an especial seat of government for Upper Silesia, the town has been much beautified both with new edifices and with parks and gardens. It contains four churches—one of which, Adelbert's Church, was founded in 995 an old castle on the island Pascheke in the channel of the Oder, a town-house, and theatre. Pop. 9608, who carry on a considerable transit-trade in timber, zinc, lead, hardware, cattle, and wines; and manufacture ribbons, linen goods, leather, and pottery.

OPPOSITION, the party in either House of the British parliament who are opposed to the existing government, and who would probably come into power on its displacement. The existence of a fair and temperate opposition, keeping a watch over the acts of the ministry, is undeniably conducive to good government; while, on the other hand, the conduct of public affairs may be seriously embarrassed by an opposition whose proceedings are conducted in a factious or obstructive spirit. The name Opposition is not generally applied to a party, merely because opposed to the existing administration, if there is no likelihood of their succeeding to power on a change of government.

OPTIC NERVE. See EYE.

OPTICAL ILLUSION. Of all the senses none is more deceptive than the sense of sight; it often deceives us as to the distance, size, shape, and colour of objects; it frequently makes them appear as if in situations where their existence is impossible; and often makes us think them movable when they are not so, and *vice versa*. An object appears to us as large or small, near or distant, according as the rays from its opposite borders meeting at the eye form a large or a small angle: when the angle is large, the object is either large or near; when small, the object must be small or distant. Practice alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object in position, with other common objects, such as trees, houses, &c., which may chance to be near it, and of which we have by experience come to form a correct idea. The same is, of course, true of apparently small objects. But when all means for comparison are removed, as when we see a distant object floating on an extensive sheet of water, or erect in an apparently boundless sandy plain, where no other object meets the eye, then our judgment is completely at fault. Imperfection in the acquired perceptions of sight, as it is called, produces many other illusions; it leads us to consider spherical solids at a distance as flat discs, and deceives us regarding the size of objects, by their colour; the sun appears larger than he would if illumined by a fainter light, and a man in a white habit seems larger than he would if he wore a dark dress. Illusions are also produced by external causes; and instances of this sort are given under MIRAGE, REFLECTION, and REFRACTION.

The property which the eye possesses of retaining an impression for a very brief, though sensible period of time (about one-quarter of a second), after the object which produced the impression has been removed, produces a third class of illusions. Common examples of this are the illumined circle formed by the rapid revolution of an ignited carbon

Virginian Opossum (*Didelphis Virginiana*).

its range extends considerably to the north of Virginia. Its form is robust, its head very large, its colour dull white; its fur long, fine, and woolly, thickly interspersed with longer coarse white hairs, except on the head and some of the upper parts, where the hair is short and close. The tail is not quite so long as the body. The Virginian O. lives much in forests and among the branches of trees, to which it usually retreats to devour its prey, twining its tail around a branch for security. Its food consists of small quadrupeds and reptiles, birds' eggs, and insects; also in part of fruits and the juicy stalks of plants. It often visits poultry-yards, and displays much cunning in its stealthy quest of prey; although otherwise it seems, like the other *Mar-supiata*, to be very low in the scale of intelligence. It seeks to escape from enemies by running to the woods and ascending a tree; but if escape is impossible, it feigns death, and maintains the imposture in very trying circumstances, however it may be kicked and beaten; but the true state of the case may be ascertained by throwing it into water. The American word *possuming* makes a figurative application of this part of the natural history of the opossum. The female sometimes produces sixteen young at a birth; the young when born are blind, naked, and shapeless, and weigh scarcely more than a grain each; they do not begin to leave the pouch until they have attained about the size of a mouse. The female O. shews a very strong attachment to her young. The O. is very easily tamed, but its strong odour makes it an unpleasant pet. The flesh of the O. is said to be good. The hair is woven into garters and girdles by the Indian women.—Other species of O. are found in the more southern parts of America. Of these, one of the largest is the CRAB-EATING O. (*D. cancrivora*) of Guiana and Brazil; which is nearly as large as the Virginian O., lives chiefly in

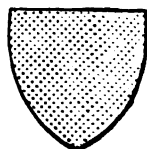
and form the groundwork of all the systems, physical as well as moral, whether of the Oriental or of the Greek philosophy; of Dualism, Parmism, and of the Christian Gnosticism and Manichæism in the east; and in the west, of the Ionian, the Eleatic, the Atomistic; no less than of the later and more familiar, Stoic, Peripatetic, and Platonistic Schools. In the philosophical writings of the fathers, of Origen, Clement of Alexandria, and above all of Augustine, the problem of the seeming mixture of good and evil in the world is the great subject of inquiry, and through all the subtleties of the mediæval schools it continued to hold an important and prominent place. But the full development of the optimistic theory as a philosophical system was reserved for the celebrated Leibnitz (q. v.). It forms the subject of his most elaborate work, entitled *Theodicea*, the main thesis of which may be briefly stated to be—that among all the systems which presented themselves to the infinite intelligence of God, as possible, God selected and created, in the existing universe, the best and most perfect, physically as well as morally. The *Theodicea*, published in 1700, was designed to meet the sceptical theories of Bayle, by shewing not only that the existence of evil, moral and physical, is not incompatible with the general perfection of the created universe, but that God, as all-wise, all-powerful, and all-perfect, has chosen out of all possible creations the best and most perfect; that had another more perfect creation been present to the divine intelligence, God's wisdom would have required of Him to select it; and that if another, even equally perfect, had been possible, there would not have been any sufficient determining motive for the creation of the present world. The details of the controversial part of the system would be out of place in this work. It will be enough to say that the existence of evil, both moral and physical, is explained as a necessary consequence of the finiteness of created beings; and it is contended that in the balance of good and evil in the existing constitution of things, the preponderance of the former is greater than in any other conceivable creation. The great argument of the optimists is the following: If the present universe be not the best that is possible, it must be either because God did not know of the (supposed) better universe, or because God was not able to create that better one, or was not willing to create it. Now every one of these hypotheses is irreconcilable with the attributes of God: the first, with His omniscience; the second, with His omnipotence; and the third, with His goodness. See Leibnitz, *Theodicea*; Baumeister's *Historia de Mundo Optimo* (Corleto, 1741); Wolfurt, *Controversia de Mundo Optimo* (Jenæ, 1743); Creuzer, *Leibnitii Doctrina de Mundo Optimo sub Examine denuo Revocata* (Leipsæ, 1795).

OPUNTIA. See PRICKLY PEAR.

OPUS OPERANTIS (Lat. literally 'the work of the worker'), a well-known theological phrase, intended to convey that the effect of a particular ministration or rite is primarily and directly due, not to the rite itself (*opus*), but to the dispositions of the recipient (*operans*). Thus, in the act of kissing or praying before a crucifix, of sprinkling one's self with holy water, of telling the prayers of the rosary upon blessed beads, the fervour and personal piety of the supplicant, and not the material object of the religious use, is held to be the efficient cause of the grace which is thereby imparted. The term is used chiefly by writers of the Roman Catholic schools, in whose system, however, the sacramental rites are held to differ from all others in this respect. See OPUS OPERATUM.

OPUS OPERATUM (Lat. literally 'the work wrought') is the phrase employed in the Catholic theological schools to describe the manner of the supposed operation of the sacramental rites in the production of Grace (q. v.). It is intended to imply that the ministration of the rite (*opus*) is in itself, through the institution of Christ, an efficient cause of grace, and that, although its operation is not infallible, but requires and presupposes certain dispositions on the part of the recipient, yet these dispositions are but *conditiones sine qua non*, and do not of themselves produce the grace; and hence, when the sacraments are administered to dying persons in a state of apparent insensibility, this is done in the hope and on the presumption that the dying person may, though seemingly unconscious, be nevertheless really disposed to receive the sacrament; but it is by no means held that if these dispositions be wanting, the sacrament will itself justify him. It is a mistake, therefore, to suppose, as is often done in popular controversy, that Catholics ascribe to the sacramental rites such magical or talismanic power that they can sanctify even an unrepentant sinner. Their efficacious operation *presupposes as conditions* the repentance and other moral dispositions of the recipient, although the grace which they give is *due, not to these dispositions, but to the sacraments as received with the dispositions*.

OR, in Heraldry, the metal gold, represented in heraldic engravings by an unlimited number of dots.



Or.

ORACHE (*Atriplex*), a genus of plants of the natural order *Chenopodiaceæ*, having male, female, and hermaphrodite flowers; the male and hermaphrodite flowers with a 3-5-partite calyx, and 3-5 stamens; the female flowers with a compressed and 2-lobed or 2-partite calyx. The species are numerous. Some of them are of frequent occurrence in waste places, and as weeds in gardens in Britain and throughout Europe. GARDEN O. (*A. hortensis*), also called MOUNTAIN SPINACH, was formerly much



Orache patula.

cultivated in England, and is still cultivated in some parts of Europe as a substitute for spinach. It is a native of Tartary, an annual, with a stem about three feet high, and cordate-triangular leaves, which are thick and glaucous, and have a

slightly acid flavour. The leaves are sometimes greenish, sometimes reddish, which is the case also in other species, and the flowers resemble the leaves in colour.—The leaves of the Sea O. (*A. littoralis*), a native of the British coast, are used in the same manner, and those of the common garden-weeds, *A. patula* and *A. angustifolia*, are excellent substitutes for spinach.—It is mentioned in Remy and Breachley's *Journey to the Salt Lake City*, that an oracle, with pale pink leaves and a salt taste, is cultivated by the Indians on the Humboldt River for its seed, which resembles that of Quinoa (*q. v.*), and is used like it for making porridge and bread.

ORACLE, the response delivered by a deity or supernatural being to a worshipper or inquirer; also the place where the response was delivered. These responses were supposed to be given by a certain divine afflatus, either through means of mankind, as in the oracles of the Pythia, and the dreams of the worshipper in the temples; or by the effect on certain objects, as the tinkling of the caldrons at Dodona, the rustling of the sacred laurel, the murmuring of the streams; or by the actions of sacred animals, as exemplified in the Apis or sacred bull of Memphis, and the feeding of holy chickens of the Romans. This arose, in fact, from the idea that the deity signified his intentions to men by signs or inspirations, which, however, had always to be interpreted to the inquirer by the priesthood. Such responses were, however, closely allied to augury, which differed in this respect that auguries could be taken anywhere, while the oracular spots were defined and limited. Oracle dates from the highest antiquity, and flourished in the most remote ages, and gradually declined with the increasing knowledge of mankind. Among the Egyptians all the temples were probably oracular, although only a few are mentioned by Herodotus, as the oracle of Latona, in the city of Buto; those of Hercules, Mars, Thebes, and Mercur. In the hieroglyphic texts the gods speak constantly in an oracular manner, and their consultation by the Pharaohs is occasionally mentioned. In later days the most renowned of these oracles was that of Ammon, in the Oasis (*q. v.*), where oracular responses were rendered either by the shaking of the statue of the god, or by his appearance in a certain manner. Oracles were also used by the Hebrews, as in the consultation of the Urim and Thummim by the high priest, and the unlawful use of Teraphims, and consultations of the gods of Phoenicia and Samaria. The Hebrew oracles were by word of mouth, as the speech of God to Moses, dreams, visions, and prophetic denunciations; besides which, there were oracles in Phoenicia, as that of Belesdub and others of the Sidonians. They were also in use throughout Assyria and Chaldaea, where the responses were derived by dreams given to the priestesses, who sat alone in the temples as concubines of the deity. So numerous were they in the ancient world, that it is said to have been in existence. The most celebrated oracles of Asia Minor were those of Delphos in Caria or Lycia, which gave the responses of Minerva, and that of Apollo at Patara; and the Delphic oracle, which rendered the highest responses.

a position resembling in some respects that of the papacy in the middle ages in Europe. The name of the first priestess who gave oracles was Phemonie. The consultations were generally in the Delphic month, Syntos or April, and once a day on other months; and the precedence of consulting the oracle was determined by lot, but rich presents obtained for Croesus and the Lydians the privilege of first consultation. Sacrifices were offered by the inquirers, who walked with laurel crowns on their heads, and delivered in sealed questions; the responses were deemed infallible, and was usually dictated by justice, sound sense, and reason, till the growing political importance of the shrine rendered the guardians of it fearful to offend, when they framed the answers in ambiguous terms, or allowed the influence of gold and presents to corrupt the inspirations. The other oracles of Apollo were at Aba in Phocis; at Ptoon, where a man prophesied, which was destroyed in the days of Alexander the Great; and at Iamessus, south of Thebes, Hyus, Tegyra, and Eutroea. In Asia Minor the most celebrated was that of Branchium, close to Miletus, celebrated in Egypt, Oryseum, and Dolos. Besides that of Dodona, Zeus had another at Olympia; and those of various other deities existed elsewhere. A secondary class of oracles of heroic or prophetic persons existed in Greece, the two most celebrated of which were those of Amphiaras and Trophonius. The first mentioned was one of the five great oracles in the days of Croesus, and was situated at Oropos, in Attica, being the shrine of a deified magician, or interpreter of dreams, having a fountain close to it. Those who consulted it, fasted a whole day, abstained from wine, sacrificed a ram to Amphiaras, and slept on the skin in the temple, where their destiny was revealed by dreams. That of Trophonius was at Lebadea, in Boeotia, and owed its origin to a deified seer. It was given in a cave, into which the votary descended, bathed, and anointed, holding a honeyed cake. He obtained a knowledge of futurity by what he saw or heard, and returned dejected from the cavern. Then, seated upon the seat of Mnemosyne, he gave an account of what he had heard, and conducted to the chapel of Good Fortune or Good Genius, recovered his usual composure. There were some other oracles of minor importance. Besides these oracles, written ones existed of the prophecies of celebrated seers, as Bacus and Musaeus, which were collected by the Psephatadae, and kept in the Acropolis of Athens. Those of the Enclius, Panolmus, and Lycus were also celebrated. Others of the Sibyls or prophetic women, daughters of Zeus and Lamia, were popular, and at a later period (see Sibyls), Athenais and others, prophesied in the days of the Seleucids. Amongst the oriental nations, as the Arabs and others, divination was and is extensively practised, but there are no set oracles. The Celtic Druids are said to have delivered responses, and the oracle of the Celtic god Belenus or Abellio, in the Isle de Sein, was celebrated. Herodot. *Hist.* v. 90, vii. 82; Curtius, iv. 7; Hare, *Ancient Greece*, (12mo, Lond. 1836, p. 141); Bos, *Antiquities of Greece* (1823, p. 31).

ORACLE (Arab. *Wazan*) a divining consultation

and 25,870 to the Sahara. Pop. 670,697. Of the inhabitants, 66,223 were immigrants, 32,055 being French; and 604,474 were natives, 592,923 being Moslems, and 11,551 Jews. The town of O. is the seat of the government offices—the prefecture, the civil, criminal, commercial tribunals, &c. It also contains a college, primary and native schools, Protestant and other churches; synagogues; mosques; a branch of the bank of Algeria; exchequer, post, and telegraph offices; three great barracks, Saint-Philippe, le Château-Neuf, and le Château-Vieux; a military hospital, with accommodation for 1400 beds (an immense new building, which overtops all surrounding edifices), and various splendidly appointed magazines and government stores. The town, which is girt by walls, and defended by strongly armed forts, is seated at the foot of a high mountain, crowned by the forts Santa-Cruz and Saint-Gregoire. The port does not offer safe anchorage; although it has been much improved within recent years, and made accessible for large vessels. In 1864, vessels had no other shelter than the roofstead of Mers-el-Kebir. The streets and promenades of O. are generally spacious, the houses elegant and airy. The principal edifices are the Château-Neuf, the residence of the general of division; the Hôtel de la Préfecture; the great mosque de la Rue Philippe; the Catholic church; and the barracks. Pop. of commune, comprising the three suburbs, Mers-el-Kebir, La Senia, and Ain-el-Turk, 34,106. The country in the vicinity is bare and arid, although the land is not sterile. To the south of the town, the country is uncultivated; but towards the south-east, highly cultivated lands are seen. In the vicinity there are a great many farms, cultivated with the greatest care, and most of them furnished with buildings necessary to their efficiency. Cattle are reared, and grain, tobacco, and cotton are grown. The vine already covers large tracts of land, and its cultivation is annually extending. It is cultivated with the most complete success, and the wines are of good quality.

Besides the commune of O., there are in the province the communes of Sidi-bel-Abbes (q. v.), of Mostaganem (pop. 11,950), of Mascara (pop. 8629), and of Tlemcen (q. v.).

The town of O. was built by the Moors. It was taken by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1732. In 1791, it was destroyed by an earthquake, and shortly after it was altogether abandoned by the Spaniards. O. was taken by the French in 1831, has since remained in their hands, and has by them been developed into a large and prosperous town. In 1858, 1584 vessels, of 64,723 tons, entered and cleared the port. In the same year the imports amounted to £1,307,616, and the exports to £280,964.—*Annuaire Général de l'Algérie*, 1864.

ORA'NG, or ORA'NG-OUTA'NG (*Simia satyrus*, or *Pithecus satyrus*, or *P. abelii*), a species of ape found in the forests of Malacca, Cochin-China, and some of the islands of that part of the world. The name is sometimes extended in signification, so as to include all the species of the restricted genus *Simia* or *Pithecus*, a genus which exists only in the south-east of Asia and the Eastern Archipelago; and was also till of late extended even to the African apes now forming the genus *Troglodytes*, the species which is the subject of this article being distinctively called the RED O., when it and the Chimpanzee were the only *anthropoid* apes known. The name orang is Malayan, and signifies man or rational being, outang signifies wild, or of the woods. The genus *Simia* or *Pithecus* differs from *Troglodytes* (the Chimpanzee and Gorilla) in the more lengthened muzzle—the lower part of the face projecting

suddenly and remarkably; in the very large canine teeth; in the great breadth of the central incisors, and in the great length of the arms, which are so long that the fingers can touch the ground when the animal stands erect. The ears are also small, and lie close to the head. The eyes are close together; the nose is little elevated; the lips are scarcely visible when the mouth is shut. The apes of this genus are arboreal in their habits, and not

Orang-Outang (*Simia satyrus*).

gregarious. They are ill adapted for walking on the ground, and in a wild state probably almost never assume an erect posture, and although they can be taught to do it in confinement, they maintain it with difficulty, and only when standing still; even then often seeking to adjust the balance of the body by raising the arms above and behind the head. In climbing and swinging among the branches of trees, the hands of the hinder extremities are used as readily as those of the anterior, and the great length of the arms is useful in enabling them to take hold of distant branches. The fingers of all the extremities are very long.

Some of the most important distinctions between the anatomy of the anthropoid apes and that of man, are noticed in the article CHIMPANZEE. The O. and its congeners are regarded as differing more widely from man in their anatomical characters than the chimpanzee and gorilla; although the number of ribs is the same as in man, and there are a few other particulars in which the O. more nearly resembles a human being than any of the African apes do. The projecting muzzle is much less notable in the young than in the adult O., and the aspect of the adult males is further rendered hideous by great callosities on the cheeks. In the adult state, the ridges of the skull also greatly increase in thickness and prominence.

The species of this genus exhibit in a much greater degree than those of *Troglodytes* an anatomical character common also to many other apes and monkeys, a pouch in the throat, opening from the windpipe, and capable of being dilated with air at the pleasure of the animal. In the O., it branches into several subordinate pouches, which are situated among the muscles of the throat. The use of this organ is not known. It does not appear to have any connection with the voice; and has been supposed, not very probably, to be of some service in leaping, by diminishing the specific gravity of the animal.

liqueur called *O. Rosoglio*, which is an article of export from some parts of Italy. Besides the use of the Sweet O. as a dessert fruit, and as a refrigerant in cases of sickness, its juice is extensively used as a refrigerant beverage, and is particularly valuable in febrile and inflammatory complaints.

O. trees are often extremely fruitful, so that a tree twenty feet high, and occupying a space of little more than twelve feet in diameter, sometimes yields from 3000 to 4000 oranges in a year. The O. tree attains an age of at least 100 to 150 years. Young trees are less productive than old ones, and the fruit is also less juicy, has a thicker rind, and more numerous seeds.

The wood of the O. tree is yellowish white and close-grained. It is used for inlaying and for turnery.

The fruit of the O. tree is of great commercial importance, for not only is it one of the most delicious and wholesome of fruits, but fortunately it is also the most easily kept and carried from place to place. No fresh fruit possesses in the same degree as the O., and its congeners, the lemon, citron, lime, &c., the property of being easily packed in boxes, when nearly ripe, and being in that state able to stand the close confinement of a ship's hold during a voyage of two or three weeks. The O. is much cultivated in the Azores, Malta, Sicily, Spain, and Portugal, and it is from these localities that Britain receives its supply. Those from St Michael's, one of the Azores, and from Malta, are the best varieties in our markets; but the *Mandarin* O. of China and the *Navel* O. of South America are much superior. The latter occasionally reach this country in small quantities from Brazil; they are nearly double the size of the ordinary O., and have a peculiar navel-like formation on the top of the fruit, which is somewhat oval in shape. The very small O., now often seen in our shops, with an extremely aromatic rind, is the *Tangerine* O., of which there are two varieties—the greater and lesser. The latter is hardly an inch in diameter, but the flesh is sweet, and the rind deliciously fragrant. The larger variety is about half the size of a common O., and is the one generally seen.

The Bitter O. is called the *Seville* O. in consequence of large plantations, which the Moors planted round the city of Seville, having for a long time furnished the chief part of those used in this country; but it also has several varieties, which are all remarkable for the bitterness of the rind, and the not very pleasant sharpness of the juice. Their chief use is for making the well-known confection called *Orange Marmalade*, and for this the true *Large-fruited* variety is the best, but it is now somewhat scarce.

Oranges, when gathered for export, must not be quite ripe; those fully formed, and with the colour just turning from green to yellow, are chosen. Each is wrapped in a piece of paper, or in the husk of Indian corn, and they are packed in boxes and half-boxes, chests and half-chests—the former are the Sicilian packages, the latter are St Michael's, Spanish, and Portuguese. A box contains about 250, a chest about 1000 oranges; and the price ranges from 15s. to 30s. per box, and from 30s. to 50s. a chest. The crop begins to arrive early in November, and the ships continue to bring them until the spring. The quantity consumed in Great Britain alone is enormous; and since the duty was removed, has reached nearly one million of bushels annually.

Orange-peel, or the rind of the O., is used both in medicine and in confectionary—for the former purpose, it is merely cut into long strips, and dried; for the latter, it is carefully separated, either in

halves or quarters, from the fruit, and after lying in salt-water for a time, is washed in clear water, and then boiled in syrup of sugar, or candied, and is sold extensively as candied peel. The rinds of the citron and lemon are treated in the same manner.

ORANGE (the ancient *Arausio*), an ill-built, decaying, and dirty, but also an interesting town of France, in the department of Vaucluse, stands in a beautiful plain on the left bank of the Aigue, 16 miles by railway north of Avignon. Its chief manufactures are silks, muslins, serges, &c.; and there are numerous oilworks, dyeworks, and tanneries. It carries on a considerable trade in wine, spirits, oils, truffes, saffron, honey, madder, and essences. Pop. (1862) 6391.

O. was the capital of a small independent principality of the same name (now comprised in the department of Vaucluse), which was ruled by its own sovereigns from the 11th to the 16th century. The last of these sovereigns, Philibert de Chalon, died in 1531, without issue. His sister, however, had married a Count of Nassau, and to that House the estates and titles passed. The Count of Nassau who obtained the principality of O. was William, the father of William I., the Stadtholder of the United Provinces. William III., Prince of Orange and king of England, having died in 1702 without issue, Frederick I. of Prussia, in virtue of the will of his maternal grandfather, Prince Henry Frederick of Orange, claimed succession. The princes of Nassau-Siegen also advanced their claims; but the discussion was closed at the peace of Utrecht (1713), when the king of Prussia finally made over the principality of Orange, for certain equivalents, to the king of France. The House of Nassau-Dietz retains, among other titles, that of the Prince of Orange.

In the vicinity of O. are several notable Roman remains. The triumphal arch, 60 feet high, with one central arcade and two lateral ones, is celebrated for the beauty of its architecture, and for its richly sculptured *bassi-relievi*. Of the theatre, the remains, though stripped of all ornamentation, are sufficiently entire to give a good idea of the arrangements of this institution as it existed among the Romans. The colossal wall which formed the *scena*, the chord of the semicircle, is 121 feet high, 334 feet long, and 13 feet thick.

O'ORANGE, a township in New Jersey, U. S., four miles north-west of Newark, containing three villages, Orange, North Orange, and South Orange. Orange Mountain commands a noble view of New York City and Bay, and its slope is laid out in beautiful parks, and ornamented with villas. It is the site of a Roman Catholic College and a Water-cure establishment. Pop. in 1860, 8877.

ORANGE COLOURS, for painters' use, are various shades of alteration produced on chrome yellow (see **YELLOW**), by acting on it either with diacetate of lead or a weak alkaline lye, both of which redden the otherwise pure yellow, and give it an orange tint.—For dyers, a beautiful orange red is obtained from safflower; and orange yellows are made by mixing, in proper proportions, any of the red with the yellow dyes.

ORANGE RIVER. See **GARIEP**.

ORANGE RIVER FREE STATE. The Orange River Free State is the name assumed by the republic of Dutch boers, who, after retiring from Natal when declared a British colony, established themselves in the country lying between the two great branches of the Orange River, the *Ky* and the *Gariiep*, known to the colonists as the *Vaal* and *Orange Rivers*, and separated from the coast

ORANGE RIVER FREE STATE—ORANGEMAN.

region by the great chain of the Quathlamba, Maluti, and Drachenberg mountains.

The Orange River Free State forms a sort of connecting-link between the Cape Colony, the Transvaal Republic, and Natal. It consists chiefly of vast undulating plains, which slope down from the Maluti Mountains to the Vaal River, dotted over here and there with rocky hills, locally called 'Koppies,' although in the northern part hundreds of square miles are found with hardly a break on the horizon. It comprises an area of about 50,000 square miles.

When the emigrant Dutch boers took possession of this country, it was inhabited by different tribes of Betjouanas and Corannas, all whom have been dispersed except the powerful Abasutu tribe, under the chief Mosheahi, who still maintain themselves in the fastnesses of the Maluti Mountains, and a few Batclapi and other Betjouanas, who dwell round the Wesleyan mission station of Thab' Unchu and Merametsu.

All the rivers of this region are affluents of either of the branches of the Gariep; amongst them may be named the Modder, Valsch, Great and Little Vet, which run into the Ky Gariep or Vaal River, and the Caledon, a considerable stream, which joins the Orange River after draining the Basutu country.

This region is a vast plateau, rising from 3000 to 5000 feet above the sea-level, with very little wood, except along the lines of the water-courses that traverse it. Travellers crossing this state from the Cape Colony to Natal arrive at the top of the passes leading to the latter colony without a mountain being in sight, and then find themselves suddenly on the edge of an immense mountain-chain, with the coast region several thousand feet below them, extending to the Indian Ocean. Immense herds of the larger antelopes formerly tenanted these vast plains, and are vividly described by Captain Harris, Gordon Cumming, and others; they are now fast disappearing, and their places are supplied by more valuable herds of horned cattle and flocks of wool-bearing sheep.

The Free State is divided into the following districts: Bloem Fontein (chief town, Bloem Fontein the capital, Boshof); Winburg (chief town, Winburg, Cronstadt); Smithfield (chief town, Smithfield); Harrismith (chief town, Harrismith); Fauresmith (chief town, Fauresmith). The chief town Bloem Fontein is situated about 150 miles north-west of Colesberg, on a tributary of the Modder River, in lat. 29° 8' S. It contains about 250 houses; a Dutch, Episcopal, and Roman Catholic Church; has two local banks, and is the seat of an Episcopal see of the Church of England. It is distant about 800 miles overland from Cape Town, and has a post twice a week with it. The other villages or small towns are all increasing and flourishing, but do not present anything remarkable.

By the latest returns, the population of the Free State was about 15,000 white and 12,000 coloured inhabitants; and the revenue, principally derived from local taxation and quit rents of farms, was £19,000.

The history of the country forming the Free State may be summed up in a few words. Captain Harris describes it, before 1836, as a howling wilderness, inhabited by wandering hordes of Bushmen and broken tribes of Betjouana and Zulu refugees from the armies of the great Zulu tyrants, Chaka, Dingaan, and Masekhutse. After the Kaffir war of 1835—1836, a spirit of dissatisfaction arising in the minds of many of the frontier boers, an extensive emigration took place along the north-east frontier of the Cape Colony; the majority of the emigrants, however, having Natal as their ultimate goal.

However, after the British government had declared it an English colony in 1843, the boers again fell back on this region, and by degrees declaring their independence of the British crown, and forming a sort of Alsatia on our very borders, after some opposition, and one or two conflicts with our troops, the country was annexed by Sir H. Smith to the British empire, under the name of the Orange River Sovereignty; and continued so until 1854, when Sir G. Clerk formally gave it up, and allowed the inhabitants to form a government according to their own wishes. The government is now in the hands of a president, freely elected by the landrost and heemraden in the several districts; while the volkaraad, or peoples' council, exercise legislative functions. But within the last year or two this little community seems almost tired of self-government; and it is very probable that before long it will endeavour to annex itself, either federally or otherwise, with the Cape Colony, as it labours under the very serious disadvantage of being, like the kingdom of Bohemia, entirely inland, and has no port on the ocean at which customs dues can be collected; thus throwing the whole of the expense of government on local taxation.

A year or two ago, a large number of Griquas—a tribe of Bastard Hottentots, who inhabited the south part of the state, and were independent—sold their farms to the Free State government, and migrated in a body to the coast side of the mountains in Independent Kaffraria, occupying a large tract of country, there known by the name of No Man's Land, on the upper waters of the Umsimvooboo River.

The Dutch boers profess the Dutch Reformed faith, and speak a dialect of Dutch, corrupted with Hottentot and English words. They marry young, and keep up, to some extent, nomadic habits. The roads and internal communication are good. Lime and timber are rather scarce, but building stone and thatch abundant. Woolled sheep have increased amazingly within the last few years; and farms that ten years ago would hardly fetch £50, are now selling freely at from £2000 to £3000.—Harris; Cumming; Blue-books; personal knowledge.

O'RANGEMAN, one of the unhappy party designations which contributed for nearly a century to create and keep alive religious and political divisions of the worst character throughout the British empire, but especially in Ireland. The Orange organisation had its origin in the animosities which had subsisted between Protestants and Catholics in Ireland from the Reformation downwards, but which reached their full development after the Revolution of 1688, and the wholesale confiscations of Catholic property by which that event was followed. From that time, the Catholics of Ireland may be said legally to have lost all social, political, and religious status in Ireland. Some attempts which were made in the latter part of the 18th c. to ameliorate their condition, excited, especially in the north, the alarm of the Protestant party, who regarded the traditional 'Protestant ascendancy' as endangered. Acts of violence became of frequent occurrence; and, as commonly happens, combinations for aggressive and defensive purposes were formed, not alone by the Protestants, but also by their Catholic antagonists. The members of the Protestant associations appear at first to have been known by the name of 'Peep-of-day Boys,' from the time at which their violence was commonly perpetrated; the Catholics who associated together for self-defence being called 'Defenders.' Collisions between armed bodies of these parties became of frequent occurrence. In 1785, a pitched battle, attended with much bloodshed, was fought in the county of

Armagh. The steps taken to repress these disorders were at once insufficient in themselves to prevent open violence, and had the effect of diverting the current into the still more dangerous channel of secret associations. The rude and illiterate mob of Peep-of-day Boys made way for the rich and influential organisation of the Orange Society, which, having its first origin in the same obscure district which had so long been the scene of agrarian violence, by degrees extended its ramifications into every portion of the British empire, and into every grade of society from the hovel to the very steps of the throne. The name of the Orange association is taken from that of the Prince of Orange, William III., and was assumed in honour of that prince, who, in Ireland, has been popularly identified with the establishment of that Protestant ascendancy which it was the object of the Orange association to sustain. The first 'Orange Lodge' was founded in the village of Loughgall, county Armagh, September 21, 1795. The immediate occasion of the crisis was a series of outrages by which Catholics were forcibly ejected from their houses and farms, 12 or 14 houses being sometimes, according to a disinterested witness, wrecked in a single night; terminating, September 1795, in an engagement, called from the place where it occurred, the Battle of the Diamond. The association which began among the ignorant peasantry soon worked its way upwards. The general disaffection towards English rule, which at that time pervaded Ireland, and in which the Catholics, as a natural consequence of their oppressed condition, largely participated, tended much to identify in the mind of Protestants the cause of disloyalty with that of popery; and the rebellion of 1798 inseparably combined the religious with the political antipathies. In November of that year, the Orange Society had already reached the dignity of a grand lodge of Ireland, with a grand master, a grand secretary, and a formal establishment in the metropolis; and in the following years, the organisation extended over the entire province of Ulster, and had its ramifications in all the centres of Protestantism in the other provinces of Ireland. In 1808, it extended to England. A grand lodge was founded at Manchester, from which warrants were issued for the entire kingdom. The seat of the grand lodge was transferred to London in 1821. The subject more than once was brought under the notice of parliament, especially in 1813; and, in consequence, the grand lodge of Ireland was dissolved; but its functions in issuing warrants, &c., were discharged vicariously through the English lodge. The most memorable crisis, however, in the history of the Orange Society was the election of a royal duke (Cumberland) in 1827 as grand master for England; and on the re-establishment of the Irish grand lodge in 1823, as imperial grand master. The Catholic Relief Act of the following year stirred up all the slumbering antipathies of creed and race, and the Orange association was propagated more vigorously than ever. Emissaries were sent out for the purpose of organising lodges, not alone in Wales and Scotland, but also in Canada, in the Mediterranean, and in the other colonies. But the most formidable part of this zealous propagandism was its introduction into the army. As early as 1824, traces of this are discoverable, and again in 1826. No fewer than 32 regiments were proved to have received warrants for holding lodges in Ireland, and the English grand lodge had issued 37 warrants for the same purpose.

The organisation of this strange association was most complete and most extensive. Subject to the central grand lodge, were three classes—county, district, and private lodges—each of which corresponded, and made returns and contributions to

its own immediate superior, by whom they were transmitted to the grand lodge. Each lodge had a master, deputy-master, secretary, committee, and chaplain. The only condition of membership was, that the party should be Protestant, and 18 years of age. The election of members was by ballot, and each lodge also annually elected its own officers and committee. The general government of the association was vested in the grand lodge, which consisted of all the great dignitaries, the grand masters of counties, and the members of another body called the grand committee. This lodge met twice each year, in May and on November 5—the day pregnant with associations calculated to keep alive the Protestant antipathies of the body. All the dignitaries of the society, as well as its various committees and executive bodies, were subject to annual re-election. In 1835, the association numbered 20 grand lodges, 80 district lodges, 1500 private lodges, and from 200,000 to 220,000 members. The worst result of the Orange association was the constant incentive which it supplied to party animosities and deeds of violence. In the north of Ireland, the party displays and processions were a perpetually recurring source of disorder, and even of bloodshed; and the spirit of fraternity which pervaded its members was a standing obstacle to the administration of the law. It was known or believed that an Orange culprit was perfectly safe in the hands of an Orange jury; and all confidence in the local administration of justice by magistrates was destroyed. These facts, as well as an allegation which was publicly made, of the existence of a conspiracy to alter the succession to the crown in favour of the Duke of Cumberland, led to a protracted parliamentary inquiry in 1835; and the results of this inquiry, as well as a very shocking outrage perpetrated soon afterwards by an armed body of Orangemen on occasion of a procession in Ireland, tended so much to discredit the association, and to awaken the public mind to a sense of the folly and wickedness of such associations, that its respectability has since that time gradually diminished. So great was the popular distrust of the administration of justice in party questions, that for several years the Lord Chancellor laid down a rule, by which no member of the Orange association was admitted to the commission of the peace; and although the association still subsists, it is comparatively without influence, except among the very lowest classes in the north of Ireland. Of the colonial offshoots of the Orange Association, those of Canada have at all times been the most active and the most flourishing. The Canadian Orangemen being, for the most part, Irish emigrants, carried with them all the bitterness of the domestic feud with the Roman Catholics. Outrages directed against Catholic churches, convents, and other institutions were of not unfrequent occurrence until recently; and on occasion of the late visit of the Prince of Wales to Canada, an attempt was made to force from his Royal Highness a recognition of the Association, which was only defeated by his own firmness, and by the judicious and moderate counsels of his advisers.—See *Reports on the Orange Association*, presented to parliament in 1835, from which the history of the society, down to that year, is for the most part taken.

ORATORIO (Ital. *oratorio*, chapel or oratory, the place where these compositions were first performed), a kind of sacred musical composition, either purely dramatic or partaking both of the drama and the epic, in which the text is illustrative of some religious subject, sometimes taken directly from Scripture; and the music consists of recitatives, airs, duets, trios, quartets, choruses, accompanied by an

orchestra, sometimes also by an organ, and introduced by an instrumental overture. The oratorio is not intended for scenic representation.

St Filippo Neri, born in 1515, has been considered the founder of the oratorio. He engaged poets and composers to produce dialogues, on subjects from scriptural and legendary history, in verse, and set to music, which were performed in his chapel or oratory on Sundays and church festivals. The subjects were *Job and his Friends*, *The Prodigal Son*, *The Angel Gabriel with the Virgin*, and *The Mystery of the Incarnation*. Stradella composed various oratorios, of which *San Giovanni Battista*, produced in 1670, is praised by Dr Burney. A number of oratorios, or *azioni sacre*, by Apostolo Zeno and Metastasio, were set to music by Caldara in the beginning of last century. Sebastian Bach's *Passion-Music* was a species of oratorio, originally performed during the service of the church, the congregation joining in the chorales. Its form arose out of the practice prevalent in the Lutheran Church, of having the gospels for the day repeated on Good Friday, and some other festivals, by different persons in a recitative and dialogue style. By far the greatest master of oratorio was Handel, who perfected that species of composition, and was the first to introduce it into England. At the age of 20, when on a visit to Italy, he produced his oratorio of *La Resurrezione* at Rome. *Esther*, the first oratorio written by him in England, was composed for the chapel of his patron, the Duke of Chandos, in 1720, the words altered from Racine. It was performed privately at Cannons in the same year, but laid aside, and not produced in public till 1732. An oratorio was then so complete a novelty in England, that it was deemed necessary to give the following explanation in advertising it: 'By His Majesty's command, at the King's Theatre in the Haymarket, on Tuesday the 2d May, will be performed the sacred Story of Esther, an oratorio in English, composed by Mr Handel, and to be performed by a great number of voices and instruments.—*N.B.* There will be no acting on the stage, but the house will be fitted up in a decent manner for the audience.' For many years after the appearance of *Esther*, no more oratorios were produced by Handel, who devoted himself to operas and other secular music; and it was only after the temporary failure of his health, that at the ripe age of 53 he resumed the composition of oratorios. The great oratorios which have made his name immortal were all produced in the decline of life, some of them after he was afflicted with blindness, and they were performed for the most part in the Old Haymarket Theatre. *Deborah* was first performed in 1733; *Mithras*, in 1734; *Israel in Egypt*, in 1738; *The Messiah*, in 1741; *Samson*, in 1742; *Judas Maccabæus*, in 1746; *Joshua*, in 1747; *Solomon*, in 1749; and *Jephtha*, in 1751. The two crowning works were *Israel in Egypt* and *The Messiah*—the former ranks highest of all compositions of the oratorio class. *The Messiah*—which, in consequence of its text being taken entirely from Scripture, was called by Handel *The Sacred Oratorio*—ranks very near it in point of musical merit, and has attained an even more universal popularity; from the time when it was first brought out, down to the present day, it has been performed for the benefit of nearly every important charitable institution in Britain. *Judas Maccabæus* is perhaps best known from the stirring and martial grace of that unrivalled military march, 'See the Conquering Hero Comes;' and *Esther* is associated in every one's mind with the most solemn of all funeral marches. The orchestra was but imperfectly developed in Handel's time, and his oratorios had therefore originally but

meagre instrumental accompaniments; they have since been generally performed with additional accompaniments written by Mozart. From Handel's time downwards, it was the practice in London to have oratorios performed twice a week during Lent in the various theatres, which were only given up on the institution of the oratorio performances at Exeter Hall. Haydn composed three oratorios—*The Return of Tobias*, *The Seven Last Words*, and *The Creation*. *The Seven Last Words*, a work full of sweetness and of energy, hardly answers to the common conditions of an oratorio; it is rather a series of symphonies, intended to follow as many short sermons on the sentences uttered by our Lord on the cross, the text being a subsequent addition by the composer's brother, Michael Haydn. *The Creation* originated in a visit of Haydn to London in 1791, when he heard for the first time some of the works of Handel, none of which were then known in Germany. Though less grand than the oratorios of Handel, it is full of fresh lovely songs, bright choruses, picturesque recitatives, and exquisite instrumentation. Beethoven's sole oratorio, *The Mount of Olives*, is a pure drama, rather than the mixed composition generally known under the name. Spohr's *Last Judgment*, produced in 1825, contains some grand music, particularly in the choruses. Costa's *Eli* deserves mention among modern oratorios. But since the time of Handel no other writer of oratorios has approached Mendelssohn. The greatest works of that composer are his oratorios of *St Paul* and *Elijah*; the former was first produced at Düsseldorf in 1836, the latter at Birmingham in 1846; and at the time of his death he was engaged in a third oratorio, called *Christus*, which he expected would be his greatest, and of which but a few fragments have been published. The oratorios of Mendelssohn have tended greatly to revive the popularity of this kind of composition in Britain. At Exeter Hall in London, and at the musical festivals throughout England, oratorios are performed on a large scale, and with a power, a precision, and a perfection unknown elsewhere. The choruses at the provincial festivals are, for the most part, supplied by Birmingham, Manchester, Leeds, and the other large towns. The greatest oratorio performances are now those of the Triennial Festivals at the Sydenham Crystal Palace. At the festival of 1862, the chorus amounted to 3120 voices, and there was an orchestra of 505 performers.

ORATORIUM (Lat. 'oratory,' called in Greek, *eukterion* or *proseukterion*), as contradistinguished from *ecclesia*, 'a church,' is the name given to an apartment or building designed for worship of a private or domestic character. From the earliest times, the use of oratoria is traceable in the history of the church; and before the regular organisation of parishes, they had probably a considerable place in the common, although not in the public worship. At a later period, oratoria became a common appendage of the castles and residences of the nobility, and were of two kinds; the first, simply for private or family prayer and other devotion; the second, for the celebration of mass. The latter fell properly under the jurisdiction of the bishop or the parochial clergy, and many jealousies and disputes grew out of their establishment or direction. The Council of Trent (Sess. xxii., *De Reformatione*) placed them under very stringent regulations, which have been enforced and developed by later popes, especially by Benedict XIV.

ORATORY, CONGREGATION OF THE. The origin of this learned Congregation, and its early history, have been detailed under the head of *St PHILIP NERI* (q. v.). It is remarkable, however, that this

extraordinary man, unlike most other founders of religious bodies in the Roman Catholic Church, had never committed to writing any definite body of rules for the government and direction of the brethren. Even his scattered papers, from which his plans and intentions might have been collected, had been burned by his orders a short time before his death. Soon after that event, the Fathers, at the instance of Baronius, compiled from the existing practices and from memory a rule for the Congregation, framed so as to embody the spirit of St Philip. This rule was approved of by Paul V. on February 21, 1612. The Fathers of the Congregation are a body of priests living in community, but without vows, and under a constitution of a highly democratical character. They are at liberty to withdraw at any time, and to resume possession of the property which they had brought with them at entrance; and even during their association, each member manages his own financial concerns, only contributing a fixed sum to the common expenses of the community. There is no superior-general, as in other orders. Each house is distinct and independent. In each, the superior is elected only for three years, and his position does not give him any personal pre-eminence whatever. The members take their places according to seniority, not according to official rank, and the superior is compelled to take his turn in all the duties, even down to the semi-menial office of serving in the refectory. The main occupations of the Fathers, beyond those of attending to the public service of the church, and the duties of the pulpit and the confessional, lie in the cultivation of theological and other sacred studies, of which 'conferences' for the discussion, in common, of theological questions, form a principal feature. The Congregation has produced many men of great eminence in sacred science, among whom have been already named the great church historian, Cardinal Baronius, and his continuators. To these may be added the celebrated explorers of the Roman catacombs, Bosio, Severani, and Aringhi; and the no less eminent patristical scholar, Gallandi. The houses of the Oratory in Italy before the Revolution were numerous, and in high repute. Few towns of any importance were without a house of the Oratory. The Congregation was early established in France by the celebrated Pierre (afterwards Cardinal) de Berulle, in common with two Italian Fathers, and from France it extended to the Low Countries. One important difference, however, is noticeable between the French Oratory and the Roman original. In the former, all the houses of the country are subject to a single superior-general. In France, also, the Oratorians took charge of seminaries and of theological teaching. The French Oratory, as well as the Italian, reckons many illustrious members; but the fame and utility of the French Congregation were much marred by the unhappy controversy about Jansenism. In the year 1847, this Congregation was introduced into England by Dr John Henry Newman (q. v.). Soon after his secession from Anglicanism, he established a house, the members of which were for the most part ex-Anglicans like himself, near, and finally at Birmingham; and soon afterwards, a second at London, which has since been transferred to Brompton.

O'RBI PICTUS (the *Pictured World*), the title of the first picture-book or illustrated manual of instruction for the young, by the celebrated educationist, Comenius, published at Nürnberg in 1657. It was long a great favourite with the youth of Germany, and continued to be reprinted, in various modified forms, down to recent times. Comenius, with the instinct of a great teacher, felt

that to give words without things to the pupil was not simply to retard his progress, but to lay the foundation of vague and inaccurate conceptions. Hence his introduction of the pictures of things into the work above named, which, among other things, was intended for those beginning the study of Latin, the connecting of the word with the picture tending to give the pupil a firmer hold or a quicker perception of both word and thing. The great and distinguishing merit of Comenius's book is, that it brought distinctly into notice the necessity of giving children in the earliest stages of their education, not simply a word, but the form of the thing of which the word was the symbol. A further advance on this idea was made by Pestalozzi, who aimed at presenting to the eye of the child the thing itself, whenever it was practicable to do so; and he regarded this as essential to the right education of the human faculties in their infancy. From this, again, flowed the excellent custom of giving Object Lessons in Infant Schools.

O'RBIT, in Astronomy, is the path described in space by a heavenly body in its revolution round its primary.* The path so described is of an elliptic form, and would be accurately an ellipse, were it not for the disturbing influence of the other heavenly bodies. See **PERTURBATIONS**. The complete determination of a planet's orbit is of the last importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets, and of the appearances and disappearances of comets. For the determination of a planet's orbit, it is necessary to know three things: 1. The situation of the *plane* of the orbit in space; 2. The position of the orbit in this plane; and 3. The situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when its inclination to the plane of the ecliptic (1), and the line of intersection of the two planes (2), are known. Since the sun, which is the focus of the planetary orbits, lies in this line of intersection, the orbit cannot lie wholly above or below the plane of the ecliptic, but must cut it in two points, called *Nodes* (q. v.), and the position of the line of intersection, or line of nodes, is generally given in terms of the longitude (or angular distance) of the ascending node, reckoning from the equinox. The situation of a planet's orbit in its plane is determined when we know its form (3), size (4), and the position of its major axis or line of apsides (5). The size and form of the orbit depend upon the length of its major and minor axes, but astronomers prefer to employ the major axis and eccentricity (see **ELLIPSE**); and the position of the major axis is known by determining the heliocentric longitude of its *perihelion* (i. e., the extremity of it which is nearest the sun). To complete our knowledge of a planet's motion, all we now require are the epoch of its appearance at some determinate point of its orbit, say, at the perihelion (6), and the velocity of its motion in its orbit (7), for when this last is known, the law of areas, as given in Kepler's second law, enables us to determine the position of the planet in its orbit at any future period. These seven facts, the possession of which gives us a complete clue to a planet's motion, are called the seven 'elements of a planet's orbit.' What has been here stated concerning the planetary orbits, is equally

* The sun is the primary of the planets and comets, and each planet is the primary of its satellites (secondary planets).

ORCHARD—ORCHESTRA.

tree of the orbits of the comets and satellites, though, in the case of the latter, the effect of disturbing forces is so great as to produce a considerable change of the elements in one revolution.

ORCHARD (Goth. *aurtigard*, Middle High Ger. *wurgarte*, Ang.-Sax. *vyrtgeard*, *ortgeard*, a yard or garden for worts or vegetables), a piece of ground specially devoted to the growth of fruit-trees, and in which these are planted as near to each other as their profitable cultivation will admit of, no space being left for culinary vegetables, as in the fruit-garden. The introduction of such crops to any considerable extent is injurious to the trees of an orchard, by exhausting the soil, and the vegetables produced are not good. In some orchards, the soil is regularly digged, and manure pretty freely supplied, the trees being *dwarf standards*, trained to a low and bushy form, in rows about twelve feet apart, with rows of gooseberries, currants, or raspberries between them. Such orchards are often very productive, and are not liable to suffer much from winds, whilst the trees also protect each other from frosts in spring. Other orchards are formed in old pastures, the turf being replaced when the trees are planted, or, if they are formed on land that has been under the plough, it is sown down with grass. In these, also, manure is occasionally given. In many cases, the grass of orchards is employed for pasturing cattle or sheep, the trees being standards or half-standards, with stems so tall that their branches are beyond the reach of the animals, and in this way the grass produced by the soil is returned to it in the form of manure. In forming orchards of this kind, it is not unusual to plant the *stocks*, upon which the proper grafts or buds are afterwards inserted. Great orchards of this kind exist in Devonshire, Herefordshire, and some other southern counties of England, devoted to the growth of apples for the production of cider, and to a smaller extent, of pears for the production of perry. Orchards are not so common in Scotland as in England, where they are not only frequent appendages of the manor-house, but even of the farm-house. Apples, pears, plums, and cherries, not of the finest kinds, are the fruits chiefly produced in British orchards, although some in England also yield walnuts, chestnuts, medlars, mulberries, quinces, &c., and there are even a few small fig-orchards in the most southern parts. Fig and peach orchards are very common in the more southern parts of Europe; and oranges, lemons, &c., on the shores of the Mediterranean.

An orchard requires a dry soil, which ought also to be free and open, not a stubborn clay. A gentle slope, exposing it to the sun, is preferable to perfectly level ground. Protection from prevalent winds, especially in Britain from the south-west winds which often blow strongly in autumn, is very necessary; but it is not less important that there should be a free circulation of air, in default of which the trees become covered with lichens and mosses, and cease to be productive. An orchard is often surrounded by a hawthorn-hedge, but a small orchard must not have a very high hedge. Forest trees are often planted as a screen, but must not be too near. Where walnut and chestnut trees will bear their fruit, they are often planted, on the side most exposed to winds, for shelter.

In laying out the ground for an orchard, it is not unusual to form it into ridges, on the crown of which the trees are planted. But, however this may be, the trees are planted in rows running north and south, so that the rays of the sun may penetrate among them somewhat equally. In planting the trees, their roots are spread out as much as possible, as it is found desirable to encourage

them to extend near the surface, rather than to penetrate deep into the ground, particularly where no digging or cropping is intended. The remarks on soil and manures in the article **FRUIT-GARDEN** are applicable also to orchards.

The districts of Scotland most celebrated for their orchards are a portion of Clydesdale (Lanarkshire) and the Carse of Gowrie (Perthshire), in both of which the apple-orchards are of very considerable economical importance.

ORCHARD-HOUSE, a structure adapted to the cultivation of fruits, of finer kinds than can be produced in the open air, or in greater perfection, without the aid of artificial heat. It is the invention of Mr Rivers of London, and is a 'glass-roofed shed,' the front of which is lower than the back, so that the roof slopes towards the sun. The merit of the invention, however, consists not so much in the structure itself, or in the protecting of fruit-trees and admitting of the sun's rays by glass, as in the mode of their treatment, by which a limited space can be made to produce a prodigious quantity of fine fruit. The trees are planted in pots, are never allowed to attain a considerable size, and are so trained and pruned as to have the greatest possible amount of fruitful wood within the smallest possible compass. The pots have a large hole in the bottom, through which the roots may pass; and are placed upon a border carefully prepared for them, of loose and open materials, such as cinders, lime-rubbish, and broken bricks, enriched by manure. After the fruit is gathered, the roots are cut through at the bottom of the pot, and the trees are set aside to rest for the winter; and this treatment is repeated from year to year. The orchard-house is generally a very low structure, so that the foliage and fruit are very near the glass; its back being only 7 feet high, and its front only 2½ feet, for a width of 12 feet. A path is excavated as a trench of 2 feet deep, and 2½ feet wide, through the middle of it. For details as to glazing, ventilation, &c., we refer to Mr Rivers's pamphlet, *The Orchard-house*, and to Chambers's *Information for the People*, i. pp. 575, 576. Plants for orchard-houses may now be purchased in nurseries. In the pamphlet of Mr Rivers, instructions will be found as to the training and treatment of different kinds of trees.

O'RCHESTRA (Gr. *orchestra*, from *orchesthai*, I dance), in the Greek theatres, the place allotted to the chorus of dancers; in modern theatres, the part of the building assigned to the instrumentalists; and in the modern concert-room, the place occupied by the instrumental and vocal performers. The word orchestra is also used to denote the musicians collectively.

A complete orchestra consists of stringed and wind instruments, and instruments of percussion. The employment of stringed and wind instruments together was long deemed a barbarism. Glück was among the first composers who shewed that they could be effectively combined, and his ideas were more fully developed by succeeding composers. The perfecting of the old instruments, and the introduction of new ones, formerly confined to military bands, have added immensely to the power and resources of the modern orchestra, whose capacities, however, have sometimes been misused.

The proper strength of an orchestra must depend on considerations connected with the locality. The stringed instruments should in all cases greatly outnumber the wind instruments; and those latter, the instruments of percussion. The stringed instruments in general use are the violin, viola, violoncello, and double-bass, and their force often amounts to as many as fifty, while even in a large orchestra

there are seldom more flutes, hautboys, or bassoons than two of each. The horn, trumpet, and ophicleide or serpent, the other wind instruments admitted into the orchestra, are used as sparingly; and of instruments of percussion, a pair of kettle-drums is often considered sufficient, though cymbals and triangles are occasionally added. In a small orchestra, trumpets, trombones, the serpent, and the kettle-drum should be avoided as being too noisy. By far the greatest part of the work falls to the share of the stringed instruments, the parts for which form a complete quartett for first violin, second violin, viola, and violoncello, which should be perfect within itself, independently of the parts for the wind instruments. The object of the double-bass is to enforce the violoncello part. This full quartett is occasionally interrupted by harmony in two or three parts, or passages in unisons or octaves. The success of the combination of wind and stringed instruments depends on the skill and judgment of the composer. The bassoon, horn, or flute may double any given part of the stringed instrument quartett, so as to produce an effect of reinforcement, or it may have its own distinctive melody. An occasional variety is produced by the entire cessation of stringed instruments for a short period, letting the wind instruments be heard alone.

The orchestra of a concert-room should be so arranged that the front is about five feet above the level of the floor, and it should rise gradually in steps towards the end wall, whose angles ought to be rounded off so as to enable the whole body of sound to be reflected. Reverberation is essential to the proper effect of music. From the exigencies of dramatic representation, a theatrical orchestra must necessarily be much inferior to a concert orchestra; the instrumentalists, brought together in the lowest part of a theatre on a horizontal plane between the spectators and the stage, are deprived of most of the advantages arising from a proper arrangement.

ORCHIDÆÆ, or **ORCHIDACEÆ**, often popularly called **ORCHIDS**, a natural order of endogenous plants, remarkable for the structure of their flowers, which are also of great beauty and exquisite fragrance. The perianth sometimes exhibits much variety of forms, even in the same species; but is always irregular, its segments differing much from each other. There are usually six segments, arranged in two rows (*calyx* and *corolla*); although some of the most extraordinary forms of orchideous flowers are produced by the combination of certain segments into one piece. Spurs and other appendages of some of the segments are also common. The inner segments are often beautifully coloured. The inferior segment of the corolla is called the lip (*labellum*), and is often lobed, spurred, or furnished with curious appendages of different kinds. The stamens are united with the style into a single central column; the distinctive character of the Linnæan class *Gynandria*, of which the *O.* form the chief part. There is usually only one anther, with a tubercle on each side of it, the tubercles being abortive anthers; but sometimes the two lateral anthers are perfect, and the central one is abortive; and very rarely all the three anthers are perfect. The anthers are usually two-celled; the grains of pollen cohering in two or more masses. The ovary is inferior, one-celled; the stigma usually a mere hollow in front of the column. The fruit is usually a capsule, opening with six valves, three of which have placentæ; the seeds numerous and very small. In a few cases, the fruit is fleshy. The *O.* are generally herbaceous perennials; but some of those found in warm

climates are shrubs, and some of these, as *Vanilla*, are climbers. The root is usually composed of simple, cylindrical fibres, which are often accompanied with one or two fleshy tubercles, a tubercle dying and a new one being produced annually.

Orchis morio;
a, parts of the flowers.

The leaves are always simple, alternate, often sheathing at the base, often leathery, sometimes arising, in tropical species, not directly from the stem, but from fleshy bulb-like excrescences of it.—The species of *O.* are very numerous, about 3000 having been described. They are found in all parts of the world, except the coldest and the most arid regions; but are most numerous in the humid forests of the torrid zone, and particularly in America. Many of them are epiphytes, adorning the boughs of trees with splendid flowers. This is chiefly the case with tropical species, those of colder climates mostly growing on the ground. Only about thirty-eight species are reckoned in the British flora.—*SALER* (q. v.), a delicate and nutritious article of food, is obtained from the root-tubercles of a number of species. The only other product of the order, which is of any commercial importance, is *Vanilla* (q. v.). The fragrant *Spasm* (q. v.) leaves are the leaves of an orchid. Several species are known to possess tonic, stimulant, and antispasmodic properties, but none are of much importance in medicine.

Orchids have of late been much cultivated on account of their flowers, and many tropical species are amongst our most esteemed hothouse plants; houses being sometimes specially devoted to them. Many of the epiphytal kinds may be planted in pots filled with loose fibrous peat, the roots of others are placed in baskets, or are fastened to blocks of wood, with a little moss or some such thing around them, to keep them from becoming too dry, and are thus placed on the shelves, or suspended from the roof of the house. Careful attention to temperature is necessary, and also to ventilation; and although much heat and moisture are requisite, the atmosphere must not be constantly very hot and humid, but seasons of rest must be given to the plants, which in their native climates have generally a wet and a dry season, the latter being to them in many respects what the winter is to plants of temperate regions.

red-hot ploughshares. The hand or foot was bound up and inspected three days afterwards: if the accused had escaped unhurt, he was pronounced innocent; if otherwise, guilty. Under such a judicial system, there were probably few acquittals; but it is believed that in the severer kinds of ordeal, precautions were sometimes taken by the clergy to protect those whom they wished to clear from suspicion. Queen Emma, mother of Edward the Confessor, when suspected of a criminal intrigue with Alwyn, Bishop of Winchester, is said to have triumphantly vindicated her character by walking unhurt over red-hot ploughshares. *Water ordeal* was the usual mode of trial allowed to bondsmen and rustics, and was of two kinds—the ordeal of *boiling water*, and of *cold water*. The ordeal of *boiling water*, according to the laws of Athelstane, consisted in taking a stone out of boiling water, where the hand had to be inserted as deep as the wrist; what was called the triple ordeal, deepened the water to the elbow. The person allowed the ordeal of *cold water* (the usual mode of trial for witchcraft), was flung into a river or pond; if he floated without any appearance of swimming, he was judged guilty—while if he sank, he was acquitted.

The *wager of battle* was a natural accompaniment of a state of society which allowed men to take the law into their own hands. The challenger faced the west, the challenged person the east; the defeated party, if he craved his life, was allowed to live as a 'recrunt'; that is, on retracting the perjury which he had sworn to. See *BATTEL, TRIAL BY*.

Other kinds of ordeal were practised in particular circumstances in different parts of Europe. In the ordeal of the *bier*, a supposed murderer was required to touch the body of the murdered person, and pronounced guilty if the blood flowed from his wounds. The ordeal of the *Eucharist* was in use among the clergy: the accused party took the sacrament in attestation of innocence, it being believed that, if guilty, he would be immediately visited with divine punishment for the sacrilege. A somewhat similar ordeal was that of the *corned*, or consecrated bread and cheese: if the accused swallowed it freely, he was pronounced innocent; if it stuck in his throat, he was presumed to be guilty. Godwin, Earl of Kent, in the reign of Edward the Confessor, when accused of the murder of the king's brother, is said to have appealed to the ordeal of the corned, and been choked by it. An early form of ordeal, abolished by Louis le Debonnaire in 816, was that of the *cross*: the accuser and accused stood upright before a cross, and he who first fell, or shifted his position, was pronounced guilty. It was done away with, as being irreverent towards the mystery of the cross. Besides these, there was the ordeal by *lot*, dependent on the throw of a pair of dice, one marked with a cross, the other plain.

Trial by ordeal at first carried with it the sanction of the priests, as well as of the civil power, though the clergy in the course of time came to discountenance it. In England it seems to have been continued till the middle of the thirteenth century. On the continent it was, generally speaking, abolished rather earlier, although as late as 1498 we find the truth of Savonarola's doctrine put to the test, by a challenge between one of his disciples and a Franciscan friar, to walk through a burning pile. In Scotland, in 1180, we find David I. enacting, in one of the assemblies of the frank tenantry of the kingdom, which were the germ of parliaments, that no one was to hold an ordinary court of justice, or a court of ordeal, whether of battle, iron, or water, except in presence of the

sheriff or one of his sergeants; though if that official failed to attend after being duly summoned, the court might be held in his absence. The first step towards the abolition of this form of trial in Saxon and Celtic countries, seems to have been the substitution of compurgation by witnesses for compurgation by ordeal. The near relatives of an accused party were expected to come forward to swear to his innocence. The number of compurgators varied, according to the importance of the case; and judgment went against the party whose kin refused to come forward, or who failed to obtain the necessary number of compurgators. To repel an accusation, it was often held necessary to have double the number of compurgators who supported it, till at length the most numerous body of compurgators carried the day.

ORDER. In Classic Architecture, the Order or ordonnance comprises the column with its base and capital and the entablature. There are five orders: (1) Tuscan, (2) Doric, (3) Ionic, (4) Corinthian, (5) Composite. The first and fifth are Roman orders, and are simply modifications of the others. The remaining three are the Greek orders. See *COLUMN, GREEK ARCHITECTURE, ROMAN ARCHITECTURE*.

ORDER, in Natural History, a group constituted for the purpose of classification, inferior to *class* and *sub-class*, but superior to *family*, *tribe*, *genus*, &c. The term *NATURAL ORDER* is used in botany to designate an order belonging to the natural system of classification, in contradistinction to one of an artificial system devised for mere convenience of the student, and signifies that the limits of the order agree with the truth of nature, and that it thus exhibits affinities really existing. In all branches of natural history, classification now proceeds on this principle.

ORDER. This word is applied to an aggregate of conventual communities comprehended under one rule, or to the societies, half military half religious, out of which the institution of knighthood sprang. Religious orders are generally classified as monastic, military, and mendicant.

The earliest comprehension of monastic societies under one rule was effected by St Basil, Archbishop of Cæsarea, who united the hermits and cenobites in his diocese, and prescribed for them a uniform constitution, recommending at the same time a vow of celibacy. The Basilian rule subsists to the present day in the Eastern Church. Next in order of time was the Benedictine order, founded by St Benedict of Nursia, who considered a mild discipline preferable to excessive austerity. The offshoots from the Benedictine order include some of the most important orders in ecclesiastical history, among others the Carthusians, Cistercians, and Præmonstrants. The order of Augustinians professed to draw their rule from the writings of St Augustine; they were the first order who were not entirely composed of laymen, but of ordained priests, or persons destined to the clerical profession.

The military orders, of which the members united the military with the religious profession, arose from the necessity under which the monks lay of defending the possessions which they had accumulated, and the supposed duty of recovering Palestine from the Saracens, and retaining possession of it. The most famous orders of this kind were the Hospitallers or Knights of St John of Jerusalem, the Knights Templars, and the Teutonic order. Many other military orders existed, and not a few continue to exist, particularly in Spain and Portugal. The phraseology of the old military orders is preserved in the orders of knighthood of modern

fact, delegating its legislative authority to the Queen in Council. For example, the International Copyright Act, 7 and 8 Vict. c. 12, contains a provision for empowering the crown, by Order in Council, to extend the privileges of British copyright to works first published in any state which gives a like privilege to the productions of this country.

ORDERS, HOLY, an institution regarded in the Greek and Roman churches as a sacrament, by which ministers are specially set apart for the service of religion, and are regarded as receiving a certain religious consecration, or, at least, designation for their office. While some of the reformed churches altogether deny the distinction of ranks in the ministry, none of them admits more than three ranks, of bishop, priest, and deacon. But in the Roman and Greek churches, a further classification exists. In the Roman Church, a distinction is made between the major (or holy) orders and the minor orders. Of the major orders, three have been described in general terms, under the head **HIERARCHY** (q. v.), viz., the classes of bishops, priests, and deacons. A fourth rank of sub-deacons is generally regarded as one of the major orders, but its functions closely resemble in their nature and their degree those of the deacon. The minor orders in the Roman Church are four in number—those of door-keeper, reader, exorcist, and acolyte. To none of these orders is any vow of celibacy annexed. Some of their functions had their origin in the peculiar religious condition of the early church. The duties of door-keeper arose chiefly out of the discipline in regard to the penitents and catechumens; but although these functions find no room in the modern discipline of the Roman Church, the door-keeper of the modern church is held to succeed to other functions of his ancient prototype in relation to the catechetical instruction of children and of the poor and ignorant. Preparatory to the receiving of these orders, candidates are initiated in what is called the *Tonsure*, which consists in the cutting off of the hair, as a symbol of separation from the world and its vanities—a rite which appears also as one of the ceremonies of the religious profession. Tonsure, however, is not reckoned as an order; it is but a distinguishing characteristic of a class. In the Roman Church, the sacrament of orders is held to produce an indelible character, and therefore to be incapable of being forfeited and of being validly repeated. This, however, applies only to the holy orders. The Greek Church has the distinction of major and minor orders, in common with the Roman. But the Greeks commonly exclude sub-deaconship from the major orders, and all the functions of the four minor orders of the Roman Church are united by the Greeks in one single order, that of reader (*anagnostes*).

In the Anglican and other Reformed Episcopal Churches, the three higher orders of bishop, priest, and deacon are alone retained. An Anglican clergyman may be deprived of his benefice, or suspended by his bishop for various ecclesiastical offences; and the right of the Court of Arches to pronounce sentence of deprivation has also been recognised. But in the usual case of deprivation, the clergyman does not forfeit his status of priest or deacon, which can only be lost by deposition or *degradation*. Statute 23, Hen. VIII., c. 1. s. 6, reserves to the ordinary the power of degrading clerks convicted of treason, petit treason, murder, and certain other felonies before judgment. A bishop may be deprived of his see by his metropolitan, with or without the co-operation of a synod of the bishops of the province, but it has been questioned whether he can be lawfully

deprived of his orders as bishop. A clergyman of the Church of England and Ireland cannot become a member of the House of Commons. In the Presbyterian and other non-episcopal churches, the ceremony of ordination is not held to impart any indelible character. A minister found guilty of heresy or immorality, is deprived of his office by *deposition*, by which his clerical status is forfeited. His removal from his charge, however, in any other way, does not affect his office as a minister; and a minister removed from one charge to another, or, after a time, inducted into a new charge, is not re-ordained. A minister having no charge or flock, may yet dispense the sacraments, if duly called upon. A minister deposed ceases altogether to be a minister, and is no more capable of any of the functions of the office, than if he had never been ordained.

The ceremony of *imposition of hands* is used in almost all Protestant churches in the ordination of ministers, the ordaining bishop or presbyters placing the right hand on the head of the person ordained; and is always accompanied with prayer. It is deemed a proper and Scriptural form (1 Tim. iv. 14), but not essential.

In the Church of Scotland and other Presbyterian churches, when an already ordained minister is inducted into a new charge, no imposition of hands takes place. In the Scottish and American Presbyterian churches, candidates for the ministry are *licensed to preach the gospel* before being called to any particular charge, and are then styled *licentiates* or *probationers*. They are licensed, according to an old phrase, 'for trial of their gifts,' but are not entitled to dispense the sacraments.

There is nothing to prevent a minister of the Church of Scotland, or any Presbyterian or Independent church, from being a member of the British House of Commons.

O'RDINAL, the service used in Episcopal churches for the ordination of ministers. The English ordinal was drawn up by a commission appointed in the third year of Edward VI. (1550), and added to the *Book of Common Prayer*. It was slightly modified in the reign of Elizabeth, and was again revised by the Convocation of 1661. The English ordinal, in its general structure, resembles the ancient services used for that purpose, but possesses much greater simplicity, and has some features—e.g., the numerous questions addressed to the candidates—peculiar to itself. There are separate services for the 'making of deacons' and the 'ordering of priests,' but these are practically joined in one, and used on the same day. The service for the consecration of bishops is altogether distinct.

The ordination takes place at one of the Ember seasons, and during the public service, after morning prayer and a sermon on the subject, and begins with the presentation of the candidates by the arch-deacon. The bishop inquires as to their fitness, and commends them to the prayers of the congregation. The litany is then said with special petitions for the candidates for each order, and the communion service commences with a special collect, epistle, and gospel. Between the epistle and gospel, the oath of supremacy is administered, and the candidates for deacons' orders are questioned by the bishop and ordained. The gospel is read by one of the newly-ordained deacons. The candidates for priests' orders are then solemnly exhorted and interrogated, and the prayers of all present are asked for the divine blessing upon them. For this purpose a pause is made in the service for silent prayer. After this the hymn, *Veni Creator Spiritus* (Come, Holy Ghost, our Souls Inspire)—a composition of great antiquity, supposed to be as old as the

In other Reformed churches ordination is performed by the presbytery, or by one or more ordinary ministers. Some small Protestant denominations have no ceremony of ordination whatever.

O'RDNANCE (*ordnance*, primarily, any disposition, arrangement, or equipment; and then applied incidentally to a particular part of the equipment or apparatus of war), a name applied to the guns and munitions of an army generally, and in particular to the great guns. Descriptions of the various sorts of ordnance will be found under **CANNON**, **FIREARMS**, **GUN**, **HOWITZER**, **MORTAR**, **RIFLED ORDNANCE**.

ORDNANCE DEPARTMENT, one of the oldest departments under the crown, was abolished by an Order in Council of the 25th May 1855, after an existence of at least 400 years. Its constitution, its important functions, and the causes which led to its dissolution, will be found under **BOARD OF ORDNANCE**. The early history of the department is lost in the middle ages; but it appears to have risen gradually under the Lancastrian kings, the first chiefs having been the commanders of the king's artillery. A Master of the Ordnance is mentioned in the time of Richard III.; but we read of John Louth being Clerk of the Ordnance as early as 1418. Henry VIII. constituted the Board, adding a Lieutenant, a Surveyor, and a Storekeeper, to whom a Clerk of the Cheque was subsequently joined. With the exception of the last, whose office was abolished in the beginning of the present century, this organisation was maintained until the abolition of the whole. In 1604, James I. dignified the Master and Lieutenant with the respective titles of Master-general and Lieutenant-general. The history of the Ordnance Office is of importance in British history, as in all wars it has been responsible not only for the management of the *matériel* of the armies, but also for the direction of the *personnel* of the artillery and engineers.

ORDNANCE SELECT COMMITTEE is a committee composed of scientific officers, and advises the Secretary of State for War on all inventions in war matériel. It has its offices at Woolwich, in the midst of the manufactories of the Royal Arsenal, and near the head-quarters of the royal artillery, by whom most of the designs have to be practically tested. The president of the committee is usually a general officer of artillery; and a captain in the royal navy serves as vice-president. The members comprise two artillery officers, one officer of engineers, and one of the line. The secretary and assistant-secretary are likewise artilleryists. With an establishment of clerks, printers, &c., the cost of the committee amounted for 1864 to £6607, exclusive of the larger sum involved for their expensive experiments.

O'RDNANCE SURVEY. By this term is understood the various operations undertaken by the Ordnance department of the British government for preparing maps and plans of the whole kingdom and its parts. The idea of a general map of the country to be executed by the government was first proposed after the rebellion in 1745, when the want of any reliable map of the northern parts of Scotland was much felt by the officers in command of the royal troops. Its execution was intrusted to Lieutenant-general Watson, the deputy quarter-master of North Britain; but it was mostly carried out by Major-general Roy, an officer of engineers. The drawing, on a scale of one inch and three-fourths to the mile, was completed in 1755; but in consequence of the war which broke out in that year, was never published. In 1763 it was proposed to extend the

survey to the whole kingdom; but the first steps to effect this were taken only in 1784, when Major-general Roy commenced measuring a base-line on Hounslow Heath, near London. This principal triangulation was designed partly for astronomical purposes, and partly as a basis for a map on a small scale. The base-line was remeasured with great care in 1791; and detail plans were commenced by officers of the Royal Engineers, partly for practising them in military drawing, and partly for the purpose of forming plans of some portions of Kent for the use of the Ordnance. The principal object was, however, the instruction of a corps of military surveyors and draughtsmen, the plans themselves being regarded as of secondary importance. In 1794, the survey for the one-inch map was begun, and some sheets were published in 1796. As the series of principal triangles were extended westwards towards the Land's End, it was thought right to measure another base, for verification, on Salisbury Plain in 1794; and two other base-lines were subsequently measured—one in 1801 at Misterton Carr, and the other in 1806 on Ruddlan Marsh. Though first intended chiefly as a military map, the publication of the survey soon created a desire on the part of the public for better maps, and surveyors were then hired to hasten its progress. This, however, was very slow, the map being at one time entirely suspended during the war in the beginning of this century, and even the parts which were executed, having been done by contract, were found very inaccurate. In this condition the survey of England continued during the first quarter of the present century, sometimes delayed by the government from motives of economy, at other times urged on by the county gentlemen, who wished the map either as a hunting-map or for local improvements.

In Scotland, the principal triangulation was begun in 1809, but was discontinued in the following year, to enable the persons who had been employed there to carry forward the subordinate triangulation required for constructing the detail maps in England. In 1813 it was resumed, and continued steadily up to 1819; a new base-line having been measured on Belhelvie Links, near Aberdeen, in 1817, and the great sector used at various stations, both on the mainland and in the islands. In 1820 it was again suspended, was resumed in 1821 and 1822, and anew broken off in 1823, the large theodolite being wanted in order to proceed with the principal triangulation in South Britain. In 1824 the survey of Ireland was begun, and nothing more was done in Scotland till 1838, except that some detail surveying for a one-inch map was continued for a few years in the southern counties. The chief strength of the surveying corps was now transferred to Ireland. A map of that country was required for the purpose of making a valuation which should form the basis of certain fiscal arrangements and other improvements which the social evils and anomalies of Ireland urgently demanded. For this map a scale of six inches to the mile was adopted, as best suited for the purposes in view. On this scale the whole map was completed, and published in 1845, though the first portions were in an imperfect form, and needing revision, which is now going on.

In 1838 the triangulation of Scotland was resumed; and the survey of Ireland having been finished in 1840, surveys for a six-inch map were begun for the northern portions of England which had not been mapped on the one-inch scale. In connection with this map, the base-line on Salisbury Plain was remeasured with great accuracy in 1849, and its length found 36577·8581 feet. In 1841, a new

ORDNANCE SURVEY.

secondary operations for a map of Scotland, also on six-inch scale, were begun; but proceeded so slowly, that in 1850 only the map of Wigtownshire and some parts of Lewis were completed. Much dissatisfaction having been expressed in Scotland by the press and public bodies, as to the slow progress of the map and the six-inch scale on which only it was published, a committee of the House of Commons (Lord Elcho's) recommended the six-inch maps to be stopped, and the one-inch map completed as speedily as possible. This change produced much discussion as to the relative value of the one-inch and six-inch scales then in use, and the expediency of adopting a still larger scale as more valuable to the public. Circulars were issued, asking the opinion of various public bodies, and of scientific and practical men, as to the proper scale for a great national survey. The great preponderance of opinion was in favour of a scale of 1-2500 of nature, or nearly one inch to the acre. This scale was therefore ordered by a treasury minute of 18th May 1855 (Lord Palmerston's), and though subsequently stopped, in consequence of a motion by Sir Denham Norreys in the House of Commons in June 1857, was again recommended by a royal commission (December 1857), and ordered to be resumed by another treasury minute (11th September 1858). In 1861 a select committee was again appointed, and reported that it is desirable that the cadastral survey on the scales directed by the treasury minute of the 18th May 1855 be extended to those portions of the United Kingdom that have been surveyed on the scale of one-inch to the mile only. This recommendation has now been adopted by the government, and the survey is at present proceeding on the following scales: Towns having 4000 or more inhabitants are surveyed on a scale of 1-500 of the linear measurement, which is equivalent to 126·72 inches to a mile, or 41½ feet to an inch; Parishes (in cultivated districts) 1-2500 of the linear measurement, equal to 25·344 inches to a mile, or one square inch to an acre; Counties on a scale of six inches to a mile; Kingdom, a general map one inch to a mile.

The sheets of the one-inch map join together, so as to form a complete map of the whole kingdom. This is true also of the sheets of each county on the six-inch scale, and of each parish on the 1-2500 scale, but the sheets of different counties and parishes are not connected. The 1-2500 scale also applies only to cultivated, populous and mineral districts; the Highlands of Scotland, and other extensive moorland and uncultivated tracts, being only surveyed on the six-inch scale, and published on the one-inch scale.

The state of the survey, at the commencement of 1864, in the three kingdoms, was as follows (Reports 1862—1863):

In England—Durham, Westmoreland, Northumberland, and Cumberland had been surveyed on the 1-2500 scale, and maps on this and the six-inch scale were being published. The revision and publication of the map on the same scale had begun in the southern counties. Lancashire and Yorkshire were published on the six-inch scale only. The whole kingdom on the one-inch scale was published except eight sheets in the north.

In Scotland, the whole country south of Aberdeen, except Argyre on the west, has been surveyed and drawn on the 25 and 6 inch scales. On the six-inch scale, 7652 square miles (including the isle of Lewis) has been published, and about 3540 miles also on the 25-inch plans. Of the one-inch map, 5047 square miles, including Fife, the Lothians, Ayr, Wigtown, and parts of Dumfries, Roxburgh, and Berwick have been completed and published with hills.

In Ireland, as stated, the six-inch maps have been

long published, and are now in process of revision. A one-inch map of the whole in outline is also published, and 3557 square miles completed with hills. The engraving of hills in the remainder is also being proceeded with.

The sketch now given of the history of this great national undertaking will shew that it has been conducted at different times on different scales and plans, and that the system now pursued was only adopted after much discussion both in parliament and out of doors. In some respects it has been the mere result of accident, and much delay and great waste of public money has resulted from no fixed and well-matured plan having been adopted in the first instance, and pursued consistently to the end. The map was originally begun as a military map, and the scale of one inch to the mile chosen, without considering whether some other scale would not offer greater advantages. Many now think that a scale a little larger, and an aliquot part of nature, such as 1-50,000, or about 1½ inch to the mile, would have been preferable for the small map; in which case a scale of 1-10,000 of nature, or about 6½ inches, might have been chosen for the intermediate, instead of the six-inch scale selected at first for mere local purposes in Ireland. Be this as it may, the arguments in favour of the one-inch map are, that it is the most convenient both as a general and travelling map. For general views of the structure of a country, the distribution and relations of its mountains, plains, valleys, and rivers, the one-inch is admitted to be superior to the six-inch, and thus better adapted in the first instance for laying out roads, railways, or other extensive public works, or for the publication of a general geological survey. Such a map, on the other hand, is on too small a scale to admit of correct measurements of small distances; it is in some respects a generalised picture, and not a correct plan. The six-inch maps were at first selected in Ireland as the smallest size on which correct measurements of distances and areas could be made. On them every house and field, and almost every tree or bush, might be laid down. Hence they are superior for working out details, as in minute surveys of railways or roads, or the complex geological structure of rich mineral districts. On such sheets, too, a proprietor or farmer may find every field laid down, and the relative heights indicated by contour lines, and may therefore use them for drainage and other improvements. It has also been proposed to use these six-inch maps as a record of sales or encumbrances of land, thus lessening the cost and simplifying the transfer of property. On the other hand, their size unfits them for most of the purposes for which the one-inch map is useful, and the contour lines give a far less vivid and correct impression of the physical features of a country than the hill sketching of the one-inch map. Most of the purposes of the six-inch plans are attained in a still more perfect manner from the 25-inch plans or cadastral survey. This last name is taken from the French *cadastre* (a register of lands), and is defined (in the *Recueil des Lois, &c.*) as a plan from which the area of land may be computed, and from which its revenue may be valued. The purposes to which these large plans may be applied are, as estate plans, for managing, draining, and otherwise improving land, for facilitating its transfer by registering sales or encumbrances; and as public maps, according to which local or general taxes may be raised, and roads, railways, canals, and other public works, laid out and executed.

Nearly all the states of Europe have produced trigonometrical surveys, many of them of great excellence as scientific works. All of these have

been published, or are in course of publication, on convenient scales; generally smaller than one inch to a statute mile. The most important of these are:

Austria and Northern Italy, scale $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Bavaria, Baden, Wurttemberg, and the Hesse territories $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Belgium, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Denmark, survey map in preparation.
 ———, Iceland, surveyed and published on different scales.
 France, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile; and a reduction to $\frac{1}{100,000}$ or 5 miles to an inch.
 Great Britain, 1 inch, 6 inches, and, in the lowland districts, 25 inches to a mile; and the coast survey, general charts, $\frac{1}{2}$ miles to an inch; harbours and bays, from 2 inches to 12 inches to a mile.
 Hanover and East Prussia, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Italy (see Sardinia, Tuscany, &c.), survey maps of Naples, Rome, &c., in progress.
 Greece (French survey) $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Netherlands, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Prussia, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile, and many smaller.
 Russia, survey map in progress.
 Sardinia, $\frac{1}{100,000}$ or $\frac{1}{4}$ th of an inch to a mile.
 Saxony, $\frac{1}{100,000}$ or $\frac{1}{4}$ th of an inch to a mile.
 Switzerland, $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile.
 Spain and Portugal, surveys commenced.
 Sweden and Norway, surveys in progress.
 Tuscany $\frac{1}{100,000}$ or about 3 miles to an inch.

The greatest extra European work of the kind is the *Trigonometrical Survey of India*, which has been conducted with great ability, and is now drawing to a close. The maps are published on a scale of $\frac{1}{100,000}$ or $\frac{1}{4}$ th of an inch to a mile, and it is expected that the whole will be completed in 1868 or 1870. In America, the coast Survey of the United States, a map of great accuracy and minute detail, has been going on for many years. The general charts are published on a scale of $\frac{1}{100,000}$ or $\frac{1}{4}$ ths of an inch to a mile; the harbours and ports $\frac{1}{100,000}$ or $\frac{3}{4}$ th of an inch to a mile. No systematic survey has yet been undertaken for the interior of the country.

No portion of South America has been trigonometrically surveyed, except the republics of Peru and Chili, which are in progress.

The Geological Survey, though under a different department of government (Science and Art), may be shortly noticed here. The English survey was begun in June 1835, by Sir Henry de la Beche, and the first Report on the Geology of Cornwall, Devon, and West Somerset was published in 1839. The Irish survey was begun in 1840, but was subsequently suspended till 1845. In 1854, the survey was extended to Scotland. The surveys are made on the six-inch maps in the parts of the country where these exist, but the results are published on the one-inch scale only, except some of the coal-fields, which are issued also on the six-inch scale. Besides the maps, sheets of sections, horizontal and vertical, with valuable memoirs, are also published. The geological survey of England began in the west, and now extends north to Lancashire, and east to the vicinity of London and Kent. The Irish survey commenced in the south, and is now published to beyond Dublin on the east coast, and the vicinity of Galway on the west. In Scotland, it has as yet been principally confined to the Lothians, Fife, and some portions of the neighbouring counties, of which several sheets are published.

OREGON, one of the United States of America, in lat. 42° — 46° N., long. 116° $40'$ — 124° $25'$ W., bounded N. by Washington, from which it is chiefly separated by Columbia River; E. by Idaho, the Lewis or Snake River intervening; S. by Nevada and California; and W. by the Pacific Ocean; being 320 miles

from east to west, by 280 from north to south, with an area of 95,274 square miles. The principal rivers are the Columbia, and its branches—the Willamette, Fall River, Snake River, and the Owyhee. The Columbia is a large river, navigable 96 miles to the Cascade Mountains, through which it passes, but the entrance is difficult. The Willamette drains a large and fertile valley between the mountains and the ocean. The Cascade Mountains, which have extinct volcanic peaks of 4000 to 10,000 feet high, run north and south, dividing the state into two unequal regions. The western third of the state, bordering the Pacific, has a mild, equable, and moist climate, with valleys of great fertility, where pines grow from 250 to 300 feet high, and firs from 4 to 10 feet in diameter. The rainfall at Astoria, mouth of the Columbia River, is 86 inches. East of the mountains, the climate is dry and variable, and the soil less fertile. Gold and silver are found in the Cascade Mountains, with copper, platinum, iridium, and osmium. Coal has been discovered on Coosue Bay. The chief agricultural productions are wheat, oats, potatoes, and apples. The great forests abound with the grisly and black bear, panther, wild-cat, elk, deer, antelope; among the birds are the California vulture, golden eagle, American swan, Canadian goose, &c.; while the rivers swarm with salmon. There were, in 1860, 19 organised counties. Most of the settlements are on the Columbia River and in the Willamette Valley. The chief towns are—Salem, the capital, on the Willamette River, pop. 1500; Portland, 2700; and Oregon City, about 2000. Within the state are about 10,000 Indians and 2000 Chinese. Two colleges have been founded, 7 academies, and 300 common schools, 2 daily and 12 weekly papers, and numerous churches. O. was the name formerly given to the whole territory west of the Rocky Mountains, claimed by the United States, as far north as lat. 54° $40'$ N. This claim was resisted by the British government, which asserted a right to the entire territory, and in 1818 a treaty was made, and renewed in 1827, giving joint occupation, which was terminated in 1846 by notice from the United States government, and the question seemed likely to involve the two countries in war, when a compromise was offered by Lord Aberdeen, on the part of the British government, and accepted by that of the United States, by which the boundary was settled on the 49th parallel. The northern portion is now Washington, and the eastern, Idaho Territory. The coast was discovered, and Columbia River entered in 1792 by Captain Gray, of Boston. It was explored in 1804 and 1805 by Captains Lewis and Clarke, U.S. army. In 1811, John Jacob Astor founded Astoria as a trading-dépôt of the American Fur Company, but sold out afterwards to the North-west Fur Company. In 1845, the gift of 320 acres of land to each married couple of settlers caused a large emigration. The territorial government was organised in 1848, and in 1859 it was admitted as a state. Pop. in 1860, 52,464.

OREIDE, a new alloy lately introduced by the French, as a substitute for ormol, which it excels in its gold-like character. There are two formulas for composing it. In the first the ingredients are: copper, 100.0; tin, 17.0; magnesia, 6.0; sal ammoniac, 3.6; quicklime, 1.80; argols, or unrefined tartar, 9.0. In the second, zinc is substituted for the tin. The latter does not possess the same brilliancy as the former. The metals are first melted, and the other ingredients, after being thoroughly incorporated together by powdering and mixing, are slowly added, and the whole is kept in a state of fusion for about an hour, and the scum removed from time to time.

ORENBURG, a town on the eastern frontier of European Russia, in the government of the same name, on the river Ural, 1393 miles south-east of St Petersburg, lat. 51° 45' N., long. 88° 6' E. The foundation of the fortress and town were laid here in 1742. Pop. 24,078. It is the centre of the governor-generalship of the government of the same name, has an excellent custom-house, and carries on an extensive trade with Khirghiz and other Asiatic tribes. It imports cotton, silk-stuffs, and shawls from Bokhara, Khiva, and Tashkent; tea (brought mostly on camels) from China; and sheep and cattle from the Kossacks and Khirghiz. The sheep are killed in autumn for the fat and skins, which are purchased by Russian merchants. Corn, skins, and metals are the principal exports. The imports amounted, in 1862, to £463,000, and the exports to £256,000.

OREODA'PHNE, a genus of trees of the natural order *Lauraceæ*, sometimes called **MOUNTAIN LAUREL**. The fruit is succulent, partly immersed in a deep thick cup formed of the tube of the calyx. *O. opifera* is a native of the countries on the lower part of the Amazon. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor.—*O. cupularis* is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Bourbon and Madagascar.—*O. fœtens*, a native of the Canaries, has wood (*Til-wood*) of a most disagreeable odour. *O. bullata*, found at the Cape of Good Hope, is also remarkable for the disagreeable odour of its wood, the *Stink-wood* of the colonists; but it is hard, durable, beautiful, takes an excellent polish, and is used in ship-building.

ORES. Any mineral or combination of minerals containing as much metal as to be profitably extracted, is reckoned by miners an ore. The proportion necessary for this purpose is, of course, very various, according to the value of the particular metal and the facility or difficulty of *reducing* the ore. A rock containing only 1 per cent. of iron is never called an ore; one containing the same proportion of gold is a very rich ore. Metals rarely exist in ores in a pure or native state; they are almost always chemically combined with oxygen, sulphur, or other elements.

Ores present themselves in a multiplicity of forms and positions in the solid crust of the earth. Sometimes they are sprinkled through the whole mass of the rocks in which they occur, as is often the case with gold, tin ore, and magnetic iron ore. Sometimes they are deposited in regular parallel beds between the strata of other rocks, as in the case of many iron-stones and of cupreous schist. At other times, they occur in irregular lumps or concretions; or they fill up the fissures of other rocks, forming veins, particularly silver, copper, and lead ores; or lastly, they are found in detritus, gravel, sand, and other alluvial deposits. This last form is evidently the result of disturbance and transport from some of the other positions above specified. And as the metallic parts of the mineral masses or rocks so disturbed and transported are the heaviest, and are insoluble in water, they are more concentrated in these deposits than in their original position, and can therefore be extracted with greater advantage. Such deposits are called *washings*, from the metal being separated from the other débris by the process of washing. Gold and platinum are mostly got in this way in the Ural and Altai Mountains, and gold in Guiana, California, and Australia. Tin ore is also found in alluvial deposits in Cornwall and India. The

reduction of ores is treated of under **METALLURGY** and the names of the several metals.

ORFILA, **MATEO JOSÉ BONAVENTURA**, a celebrated physician and chemist, and the recognised founder of the science of toxicology, was born at Mahon in Minorca, 24th April 1787. His father, who was a merchant, intended that his son should follow the same pursuit; but young O. shewed so strong a predilection for the study of medicine, that all thoughts of a mercantile career for him were dismissed, and he was sent to the medical schools of Valencia and Barcelona. In the latter of these seminaries, he so distinguished himself, that the junta of the province resolved to defray the expense of his further education in Paris, on condition of his returning to Barcelona to fill one of the chairs in their medical school; and accordingly O. departed for Paris in 1807. The junta were prevented from fulfilling the agreement by the outbreak of war with France; but O., who had now made many friends in Paris, was enabled to continue his studies. In October 1811, he received the degree of Doctor of Medicine, and immediately commenced a private course of lectures on chemistry, botany, and anatomy, which was largely attended, and, along with his successful practice, soon rendered him famous. In 1813 appeared the first edition of his celebrated work on poisons, entitled *Traité des Poisons tirés des Règnes Minéral, Végétal, et Animal, ou Toxicologie Générale* (Paris). The work was commended by the Institute, and rapidly passed through a number of editions. In 1816, on the occasion of a short visit to Minorca, he met with an enthusiastic reception; and on his return to Paris, became court physician. In 1819, he was created a citizen of France, and became professor of jurisprudence; and in 1823, was transferred to the chair of chemistry, to which, in 1831, was added the deanship of the faculty. His prosperity was now at the full; his lectures were more popular than ever; his works were reckoned as master-pieces; and he himself, by the geniality of his disposition and his many accomplishments, was a universal favourite in society. In all cases of suspected poisoning, he was a most important witness. From 1834, he was a member of the council of public instruction, and procured the passing of many useful measures, such as the creation of secondary medical schools, and the multiplication of means of instruction and observation. He also organised the clinical hospital, founded a new botanic garden, and a museum of comparative anatomy, which is now known by his name. On the outbreak of the revolution of 1848, he was deprived of his place in the medical faculty on account of his conservative opinions, but retained his professorship. He died at Paris, March 12, 1853. His great work on toxicology has gained for him undying fame; it is a vast mine of information, the result of the author's solitary indefatigable researches; and includes symptoms of poisoning of all kinds, the appearances in the body to which poisons give rise, their action, and the means for their detection. It is well written, and exhibits the accuracy of language equally with the sound judgment of its author. His other works are not nearly so famous, partaking more of the character of compilations; the chief of them are—*Elémens de Chimie appliqués à la Médecine* (Paris, 1817; 8th edition, 1851); *Traité de Médecine Légale* (1823—1825; 4th edition, 1847); *Mémoires sur Plusieurs Questions Médico-légales* (Paris, 1839); and *Recherches sur l'empoisonnement par l'Acide Arsenieux*, &c. (Paris, 1841). He also contributed largely to various journals, dictionaries, encyclopedias, and other periodicals. He has left a number of Memoirs, which have not yet been published.

stop, of small diameter, so called from the sweetness of its tone. Among the reed-stops are the *clarion*, *oboe*, *basoon*, and *vox humana*, deriving their names from real or fancied resemblances to these instruments and to the human voice. Of the compound-stops, the most prevalent in Britain is the *sesquialtera*, consisting of four or five ranks of open metal pipes, often a 17th, 19th, 22d, 26th, and 29th from the ground-tone. The resources of the organ are further increased by appliances called *couplers*, by which a second clavier and its stops can be brought into play, or the same clavier can be united to itself in the octave below or above.

Organs are now generally tuned on the equal temperament. See TEMPERAMENT. The notation for the organ is the same as for the pianoforte, in two staves in the treble and bass clefs; but in old compositions, the soprano, tenor, and alto clefs are used.

Instruments of a rude description, comprising more or less of the principle of the organ, seem to have existed early. Vitruvius makes mention of a hydraulic organ, but his description is not very intelligible. The organ is said to have been first introduced into church music by Pope Vitalian I. in 666. In 757, a great organ was sent as a present to Pepin by the Byzantine emperor, Constantine Copronymus, and placed in the church of St Corneille at Compiègne. Soon after Charlemagne's time, organs became common. In the 11th c., a monk named Theophilus wrote a curious treatise on organ-building. But it was not till the 15th c. that the organ began to be anything like the noble instrument which it now is. The family of the Antignati, in Brescia, had a great name as organ-builders in the 15th and 16th centuries. The organs of England were also in high repute, but the puritanism of the civil war doomed most of them to destruction; and when they had to be replaced after the Restoration, it was found that there was no longer a sufficiency of builders in the country. Foreign organ-builders were therefore invited to settle in England, the most remarkable of whom were Bernhard Schmidt (generally called Father Smith) and his nephews, and Renatus Harris. Christopher Schreider, Snetzler, and Byfield succeeded them; and at a later period, Green and Avery, some of whose organs have never been surpassed in tone, though in mechanism those of modern builders are an immense advance on them. The largest English organs are those of York Cathedral, Birmingham Town Hall, and Christ Church, London. The two largest organs in the world are at Haarlem and Rotterdam; the former, 103 feet high and 50 broad, was built in 1738 by Christian Müller. The German organs are remarkable for preserving the balance of power well among the various masses, but in mechanical contrivances they are surpassed by those of England.

For a full account of the structure of the organ, see Hopkins and Rimbault, *The Organ, its History and Construction* (Lond. 1855). Rink's *Praktische Orgelschule*, Leipzig, v. y., is the best work on organ playing.

ORGAN, ORGANIC, ORGANISM. The word *organ* is derived from the Greek *organon*, an instrument, and is sometimes employed almost in its original sense. But it has received a signification more peculiarly its own, and with which alone the word *organism* is connected, as the designation of any of the parts or members of a living body, the *organism* being the living whole, animal or vegetable, which these organs compose. The idea of an organism or of organisation is almost as much involved in obscurity and difficulty as that of *life*, with which it is so closely connected. But it is observable that a living body is entirely composed

of organs, and these themselves of other organs, until we come to elementary cells; and also, that all the parts are mutually dependent on each other; and therefore an organism has been defined as a natural whole, in which all the parts are mutually to each other means and end. The juice which nourishes a plant is elaborated by the plant itself, although the supplies are drawn from without. The leaves of a plant are produced by the stem, but re-act upon the stem in promoting its growth. This mutual dependence of parts strongly distinguishes an organism from a *machine*, in which the parts concur for a common end, to which each contributes in its own way, but in which each does not contribute to the support of all or any of the rest. In organisms, moreover, besides this support and maintenance of the different parts or organs, there is a provision for the production of new organisms of the same kind, the reproduction or propagation of the species, to which there is nothing analogous beyond the sphere of organic life. Amongst organic beings, as we ascend in the scale from the lowest kinds of plants and animals to the highest, we observe an increasing number of organs and of functions of organs. In the animal kingdom, organic life appears as possessed of sensation and spontaneous motion; whilst plants are limited to growth, assimilation, and propagation. The question as to the nature of organic processes connects itself with a most difficult question as to the relation of chemical processes with psychical functions, chemical processes being certainly carried on, but singularly modified or directed by the living powers of the organic being.—The term *organic* is frequently applied to those things in which an analogy is traced to living creatures, in the mutual dependence of parts. Such an analogy may be traced in social life and in political life; and the more perfectly this relation of mutual dependence or mutual usefulness is established, the better is the state of things, social or political. It is also the highest praise of a work of art, that it suggests this idea of an organic relation of its parts to each other, and to the whole.—*Organic Laws* are those which are fundamental or most essential to the system to which they belong.

ORGANIC ANALYSIS. When a complex organic substance is submitted to chemical examination, the first point is to determine its *proximate* constituents, or, in other words, the several definite compounds of which it is made up. Opium, for example, is thus found to have as its proximate constituents meconic acid, morphia, codeia, and some ten or twelve other substances. The modes by which these proximate constituents are separated are various; the chief being the action of certain solvents, such as ether, alcohol, and water, which extract some of the materials and leave others undissolved. Thus ether is the special solvent of fatty and waxy matters, resins, and camphore; alcohol dissolves the same substances with less facility, but on the other hand takes up many substances which are insoluble in ether; while water, which scarcely acts upon the above-named matters, dissolves saccharine, gummy, and starchy matters, and salts of organic acids. The proximate constituents being thus determined, the next point is to determine their qualitative and quantitative (or ultimate) composition; and it is to these processes—especially the last—that the term *organic analysis* is for the most part restricted.

Qualitative Analysis.—It is shewn in the article ORGANIC COMPOUNDS, that the ordinary ingredients for which we must seek are carbon, hydrogen, oxygen, nitrogen, and sulphur. Carbon and hydrogen may be simultaneously detected by burning the compound (which must be previously well dried) in

illustrations of the meaning of these terms to the monamines, both because they form the most important group and because they are much more readily elucidated than the other groups, which are extremely complicated in their composition. *Monamines* are constructed upon the single atom of ammonia, H_3N . In *primary monamines* one of the atoms of hydrogen is replaced by an organic radical, R ; and hence their general formula is RH_2N . Ethyl-amine or ethylia ($\text{C}_2\text{H}_5\text{H}_2\text{N}$, or $\text{C}_2\text{H}_5\text{N}$, is an example. In *secondary monamines* two of the atoms of hydrogen are replaced by two atoms of either the same or of different radicals. Hence their general formula is $\text{RR}'\text{HN}$, where R and R' may be the same or different radicals. Diethylia ($\text{C}_2\text{H}_5\text{C}_2\text{H}_5\text{HN}$, or $\text{C}_2\text{H}_5\text{H}_2\text{N}$, and methyl-ethyl-amine, or methyl-ethylia ($\text{C}_2\text{H}_5\text{C}_2\text{H}_5\text{HN}$, or $\text{C}_2\text{H}_5\text{H}_2\text{N}$, are examples. In *tertiary monamines* the three atoms of hydrogen are replaced by three atoms of the same or different radicals; their formula therefore is $\text{RR}'\text{R}''\text{N}$, when R , R' , R'' may or may not differ from one another. Trimethylamine or trimethylia ($\text{C}_2\text{H}_5\text{C}_2\text{H}_5\text{C}_2\text{H}_5\text{N}$, or $\text{C}_2\text{H}_5\text{H}_2\text{N}$, and methyl-ethyl-phenyl-amine or methyl-ethyl-phenylia ($\text{C}_2\text{H}_5\text{C}_2\text{H}_5\text{C}_6\text{H}_5\text{N}$, or $\text{C}_2\text{H}_5\text{H}_2\text{N}$, afford examples of the radicals being all the same and of their being all different. This last example affords a good illustration of the fact, that although the modern nomenclature of organic chemistry includes long and apparently complex words, these words to a great degree represent the composition of the substance they are used to indicate; methyl (C_2H_5), ethyl (C_2H_5), and phenyl (C_6H_5), mainly contributing to form methyl-ethyl-phenylia.

(2) Although all attempts at forming in the laboratory those alkaloids that naturally exist in plants, such as morphia, quinia, and strychnia, have hitherto failed, a large number of organic bases have been prepared by artificial means, such as: *a.* By the destructive distillation of organic bodies containing nitrogen. Thus, in the preparation of coal-gas, four at least of these compounds are obtained—viz., aniline, picoline, leukol (or quinoline), and pyridine. *b.* By the distillation of certain nitrogenous compounds with caustic potash. In this way aniline is obtained from indigo. *c.* By the combination of ammonia with the aldehyds and with certain volatile oils which possess the properties of aldehyds. Thus acetic aldehyd yields dimethylia, and oil of mustard yields thyoaminia. *d.* By the substitution (by the action of strong nitric acid) of one atom of nitrous acid (NO_2) for one atom of hydrogen in certain hydrocarbons. *e.* By the processes of fermentation and putrefaction. Thus wheat flour yields by putrefaction trimethylia, ethylia, and amyliia.

ORGANIC COMPOUNDS. It was formerly believed that the compounds to which the term *organic* is applied could only be produced by a vital force acting in a more or less complex animal or vegetable organism. It is, however, now known that this view is altogether untenable, and that many substances which are products of animal or vegetable organisms may also be formed artificially in the laboratory. Thus urica, the chief and most characteristic organic constituent of urine, may be formed by the direct union of chlorine and carbonic acid (which form *phlogene gas*) with ammonia; and glucose or grape-sugar may be artificially produced from starch, woody fibre, paper, linen, &c. Although such cases as that of urica, in which a complex organic product ($\text{C}_2\text{H}_4\text{O}_2\text{N}_2$) is produced by the direct union of three inorganic substances (and many other cases of the same nature might be adduced), shew that there is no definite line of demarcation between organic and inorganic products, it is useful as a matter of convenience, to classify

chemical compounds according to their natural origin.

The following are the leading characteristics of organic compounds: Those which occur naturally rarely consist of more than four elements—viz., carbon, hydrogen, nitrogen, and oxygen—although a few contain sulphur, and possibly (but this is doubtful) phosphorus. By artificial means, however, organic compounds can be formed containing chlorine, bromine, iodine, selenium, tellurium, and many of the metals. Carbon is universally present both in natural and artificial organic compounds. The number of equivalents entering into the composition of organic compounds is usually higher than in the case of inorganic compounds. There is no organic compound into which less than two equivalents of carbon enter, and, according to some chemists, both oxygen and sulphur only enter these compounds in double equivalents. Melissic acid, for example (one of the constituents of wax), is represented by $\text{C}_{26}\text{H}_{50}\text{O}_2$; that is to say, each equivalent of the acid is composed of 124 equivalents of the elements entering into its composition; and each equivalent of the solid fat, commonly known as stearine, contains 114 equivalents of carbon, 110 of hydrogen, and 12 of oxygen. No instance is known in which an organic compound has been formed by the direct union of its elements in a free state, as many sulphides, chlorides, and oxides (for example) are formed in inorganic chemistry. Their extreme readiness to decompose under the influence of heat, fermentation, putrefaction, &c., is another characteristic of organic compounds, although some artificially prepared inorganic compounds—as, for example, chloride of nitrogen—are also very unstable.

The following scheme may serve to elucidate the arrangement of the elements in organic compounds. Such compounds may be composed of carbon and oxygen, as carbonic oxide, C_2O_2 ; or of carbon and hydrogen, as oil of turpentine, $\text{C}_{10}\text{H}_{16}$; or of carbon and nitrogen, as cyanogen, C_2N_2 ; or of carbon, hydrogen, and oxygen, as grape-sugar, $\text{C}_{12}\text{H}_{22}\text{O}_{12}$; or of carbon, nitrogen, and oxygen, as anhydrous cyanic acid, $\text{C}_2\text{N}_2\text{O}$; or of carbon, hydrogen, and nitrogen, as nicotine, $\text{C}_{10}\text{H}_{14}\text{N}_2$; or of carbon, hydrogen, and sulphur, as oil of garlic, $\text{C}_6\text{H}_5\text{S}$; or of carbon, hydrogen, nitrogen, and oxygen, as caffeine, $\text{C}_{10}\text{H}_{14}\text{N}_4\text{O}_4$; or of carbon, hydrogen, nitrogen, and sulphur, as oil of mustard, $\text{C}_6\text{H}_5\text{NS}_2$; or finally, of carbon, hydrogen, nitrogen, oxygen, and sulphur, as taurine, $\text{C}_4\text{H}_8\text{NO}_4\text{S}_2$. Hence organic compounds may be binary, ternary, quaternary, or quinary in their composition.

ORGANIC RADICALS. Under the term Organic or Compound Radicals (or Radicles, as some chemists write the word) are included a number of groups of elements, of which carbon is always one, which comport themselves chemically like simple elementary bodies. The careful study of organic compounds led chemists to perceive that many of these contained as a proximate constituent a more or less complex atomic group, which in its combining relations behaves precisely like the elementary substances, and which, like them, may be transferred from one compound to another; and hence the inference was drawn, that all organic compounds were combinations of organic radicals with oxygen, sulphur, hydrogen, or other elements, or of one organic radical with another. In accordance with this view, Liebig defined organic chemistry as *The Chemistry of Organic Radicals*. In order to shew how much the theory of organic radicals serves to elucidate the composition of organic compounds, and to reduce the laws of organic to those of inorganic chemistry, we will point out some of the chemical analogies between the radical *ethyl* (C_2H_5) and the

ORGIES (probably from Gr. *erdo*, in the perfect, *eorga*, to sacrifice), or MYSTERIES, secret rites or customs connected with the worship of some of the pagan deities; as the secret worship of Ceres (q. v.), and the festival of Bacchus, which was accompanied with mystical customs and drunken revelry. The name is now applied to scenes of drunkenness and debauchery.

ORGUES are thick, long, wooden beams, pointed and shod with iron, hung vertically by separate ropes in the gateway of, and over the entrance to a fortified place. They answer the purpose of a portcullis or door, and are dropped into position by cutting the ropes from which they hang. Their descent is inevitable, in which they possess an advantage over the portcullis, which may be held up by the enemy or blown in by petards, whereas petards have little effect on orgues, for if one beam be destroyed, another can be dropped to fill up the gap.

O'RIEL COLLEGE. In 1324, Adam de Brom, almoner of Edward II., procured from the sovereign a charter of incorporation for a college, under the name of St Mary's House, in Oxford. The origin of the name 'Oriol College' is uncertain. It consisted originally of a provost and 10 fellows. The number of fellows was by subsequent benefactions raised to 18, and several exhibitions and scholarships were also founded at various times. By the commissioners under 17 and 18 Vict. c. 81, all the fellowships are thrown open, but three are in the meantime suspended for the purpose of increasing the number and value of the scholarships, and of augmenting the salary of the professor of modern history. By the same authority the scholars are placed on the foundation of the college, a position they did not before enjoy; the scholarships are made ten in number, tenable for five years, of value £60 per annum, with rooms free. This college was one of the first to throw open such of its fellowships as it could to competition, and hence the fellows of Oriol have long been among the most distinguished men in the university. For several years back, however, its undergraduates have done little in the schools. The fellows divide upwards of £200 a year, in addition to allowances; and the income of the provostship, to which is annexed a living in Essex and a canonry in Rochester Cathedral, is estimated at £2000 a year. There are thirteen benefices in the gift of this college.

ORIEL WINDOW, a projecting window having more sides than one, usually three, and commonly divided into bays by mullions. It is one of the most picturesque features in mediæval and Elizabethan domestic architecture, and adds much to the convenience of the interior. The word oriel (Mod. Lat. *oriolum*, probably dim. from *os, oris*, as if a small opening or recess) formerly meant a chamber or apartment, and a window is so called which makes a small apartment, as it were, off a large room. Oriels are also called Bay or Bow Windows (q. v.).

ORIENTATION. As Christians from an early period turned their faces eastward when praying, so Christian churches for the most part were placed east and west, in order that the worshippers, as they looked towards the altar, might also look towards the east. Modern observation, however, has found that few churches stand exactly east and west, the great majority inclining a little either to the north or to the south. Thus, of three ancient churches in Edinburgh, it was ascertained that one (St Margaret's Chapel in the Castle) pointed E.S.E.; another (St Giles's Cathedral), E.-by-S.4S.; a third (Trinity College Church, now destroyed), E.4S.

This deviation from the true east has received, among English ecclesiologists, the name of 'Orientation.' Its origin or cause has not been satisfactorily explained. Some have supposed that the church was turned not to the true east, but to the point at which the sun rose on the morning of the feast of the patron saint. But, unfortunately for this theory, neighbouring churches, dedicated in honour of the same saint, have different orientations. Thus, All Saints' at West Beckham, in Norfolk, points due east; while All Saints' at Thwaite, also in Norfolk, is 8° to the north of east. There are instances, too, in which different parts of the same church have different orientations; that is to say, the chancel and the nave have not been built in exactly the same line. This is the case in York Minster and in Lichfield Cathedral. Another theory is, that orientation 'mystically represents the bowing of our Saviour's head in death, which Catholic tradition asserts to have been to the right [or north] side.' But this theory is gainsaid by the fact, that the orientation is as often to the south as to the north. Until some better explanation is offered, it may, perhaps, be allowed to hold, that orientation has had no graver origin than carelessness, ignorance, or indifference.

O'RIFLAMME, or AURIFLAMME (Lat. *auri flamma*, flame of gold), a banner which originally belonged to the Abbey of St Denis, and was borne by the Counts of Vexin, patrons of that church, but which, after the county of Vexin fell into the hands of the French crown, became the principal banner of the kingdom. It was charged with a saltire wavy or, with rays issuing from the centre crossways. In later times the oriflamme became the insignia of the French infantry. The name seems also to have been given to other flags; according to Sir N. H. Nicolas, the oriflamme borne at Agincourt was an oblong red flag split into five parts.

ORIGENES (ORIGEN), called *Adamantinos* or *Chalchentecos*—both epithets expressive of his firmness of purpose and iron assiduity—one of the most eminent of the early Christian writers, 'the father of biblical criticism and exegesis in Christendom,' was born 185 A.D., at Alexandria, where his father, Leonidas, seems to have held some superior office in the church. O. received a most liberal education. While, on the one hand, he was initiated at an early age into Hellenic science and art, the teachings of Christianity were instilled into his mind by men like Pantenus and Clemens of Alexandria. During the persecutions against the Christians, instituted by Sept. Severus, his father died the death of a martyr, and O., then 17 years of age, would have shared it of his own free will, had not his mother, left unsupported with six children, prevented him. After a short time his zeal and erudition procured for him the office of catechist in the Alexandrian church; but no salary being affixed to it, he was fain to dispose of his much-loved collection of classical authors for a daily stipend of four oboli (2d.) for several years. His wants were extremely limited, and his asceticism led him even to self-mutilation (in accordance with the view he took of Matt. xix. 12) : an act for which he afterwards expressed the deepest sorrow, and which became a dangerous weapon in the hands of his antagonists. Not a few of his hearers being masters of Greek (Neoplatonic) philosophy, O., in order to ward off more successfully their attacks upon his doctrines, and to combat them on their own ground, applied himself particularly to this science, and Ammonius Saccas himself is said to have been his teacher. From this

period also may be dated O.'s transition from unconscious to conscious belief. He examined henceforth, with as little prejudice as possible, all the different systems of human speculations that came under his notice during the many journeys he undertook, proceeding on the principle 'that we are not, under the pretence of piety, to pin our faith on that which is held by the multitude, and which therefore alone seems to stand on high authority, but on that which results through examination and logical conclusions from established and admitted truths.' This liberality of his mind and doctrines could not fail, on the one hand, to bring about many conversions to the faith, as he taught it, both among 'pagans' and 'heretics,' the latter chiefly of the Gnostic sects; and on the other hand, to raise an outcry among less liberal professors and teachers of the faith, who had not been so successful in their labours. What gave the greatest offence in his teachings was his way of explaining, after the manner of the Midrash, known to him through the Jewish masters (from whom, at an advanced age, he had also learned Hebrew), allegorically and symbolically that which in the Scripture warred with the common human understanding, or seemed repugnant in manner or matter. Furthermore, while expounding all the ethical portions of the Bible, he rejected a great deal of its supposed historical and legal contents for all purposes, save, perhaps, as starting-points for homiletics. 'What edification,' he says, 'could we find in literally interpreting the story of Abraham's first telling Abimelech a lie, and then, with Sarah's consent, handing her over to him and prostituting her?' As to the discrepancies in the different gospels respecting the life of Christ, he says: 'One of two only is possible. Either these things are true in a spiritual sense only, or as long as the discrepancies are not satisfactorily explained away, we cannot believe in the gospels but as dictated by the Holy Ghost, and redacted under the influence of his inspiration.'

In 211 he went to Rome, but soon afterwards, at the wish of Bishop Demetrius, he returned to Alexandria, which, however, he was obliged to leave precipitately, and to seek refuge from certain popular tumults in Palestine. Here the bishops received him with great honours, and desired him to institute public lectures, in which they themselves became hearers. Recalled again by the Alexandrian bishop, he was sent to Achaia to combat certain heresies that had broken out there. The wrath that had silently been gathering against him found its first vent when, in 228, the bishops assembled in Caesarea in Palestine consecrated him martyr. The Bishop of Alexandria took umbrage at this outrage, as he called it, on his authority. Two councils were convoked, and in 232, O. was deprived of his priestly office, and excommunicated, the principal heresy charged against him being his denial of eternal punishment. Yet the churches of the East remained faithful to him. Palestine, Arabia, Persia, and Achaia remained in constant communication with him; and men like Gregory Thaumaturgus (q. v.), Athenodorus, and others remained or became his faithful disciples ever after, while the Bishop of Caesarea allowed him openly to expound the Scripture in his church. The persecutions under Maximianus again forced him to seek refuge for two years in Cappadocia. Returning under Gordianus, he resumed his labours and journeys, until, when Decius ascended the throne, he was seized, imprisoned, and tortured for his faith. He did not survive his sufferings long, but died, in 254, at Tyre, where his tomb, near the high-altar of the cathedral, was venerated for many centuries, until it was destroyed during the Crusades.

The number of his works is stated by Epiphanius and Rufinus to have exceeded 6000, and although this is probably only meant as an exaggerated round number, yet the amount of writings that issued from his always busy brain and hands cannot but have been enormous. Seven secretaries and seven copyists, aided by an uncertain number of young girls, are by Eusebius reported to have been always at work for him. The great bulk of his works is lost; but among those that have survived, the most important by far are his two editions of the Old Testament, called respectively *Tetrapla* (fourfold) and *Hexapla* (sixfold). See *HEXAPLA*. The labour bestowed upon this work must have been immense, and no less than twenty-eight years is O. supposed to have been engaged upon it. On its importance for biblical criticism it is needless to enlarge here. Fragments only have come down to us, the original having been lost during the siege and capture of Caesarea by the Arabs; and the Greek as well as the Roman clergy having almost laid an interdict upon the copying of any of O.'s much suspected writings. Montfaucon has collected and edited these fragments (*Hexaplorum Origenis quæ supersunt*, 2 vols. fol. Paris, 1714), which were re-edited by C. F. Bahrdt (1769—1770). Of his other partly extant, partly lost works, the chief are his books 'On the Resurrection,' 'On Martyrdom,' 'Eight Books against Celsus,' 'On Prayer,' besides Epistles, &c. He further revised and enlarged Philo's Lexicon of Hebrew Names (*Hebraicorum Nominum S. Scripturæ et Menſurarum Interpretatio*), whence it has often, together with many other spurious works, been ascribed to him exclusively. Little also has survived of his many exegetical writings, commentaries, brief notes, and homilies on both Testaments. The best editions of his collected works are by De la Rue (Rudens), (Paris, 1733—1759, 4 vols. fol.); by Oberthür (Wurzbourg, 1785—1794, 15 vols.); and by Lommatzsch, which is critical and more complete (Berlin, 1831), &c.

ORIGINAL SIN. According to this theological tenet, when stated in its extremest form, men come into the world with the reason and will utterly corrupt. This corruption originated in the fall of Adam, and has been inherited equally by all his posterity, so that the natural man is not only incapable of knowing and loving God and goodness, but is inclined to condemn God and pursue evil; on which account the anger of God has subjected him to temporal death, and destined him to everlasting punishment in hell. The doctrine is founded on the account of the fall given in Genesis, and on some passages in Paul's Epistle to the Galatians, and in that to the Romans; which passages, however, are held by others to contain no such doctrine; and indeed nearly every point in the history of the doctrine is the subject of as much controversy as the details of the doctrine itself. The early church, it is maintained by one school, was unacquainted with it; and the most orthodox admit that the doctrine had not at that time been fully developed. The Christian fathers, Justin Martyr, Clemens Alexandrinus, Irenæus, and others, ascribe to the natural man a certain ability to know God and choose the good, they are said to reject distinctly all propagation of sin and guilt, and even to refer human mortality not to Adam's sin, but solely to the constitution of the body. Origen, on the other hand, in opposition to the Gnostics and Manichees, who grounded the sinfulness of men on the connection of the soul with a material body, asserted that the sinfulness was in existence at birth, but ascribed the development of actual sins and their consequences not

to propagation, but to the moral operation of precept and example. He accordingly found the cause of sin to be in the freedom of the will, the abuse of which he explained partly by the operation of evil powers, partly by the predominance of the sensuous part of man's nature over the rational mind. The orthodox teachers of the Greek Church, again, held that Adam, by the fall, rendered himself and all his posterity mortal, but, according to the less rigid schools, they looked for the origin of sin in the freedom of the will acted upon by the flesh, and by demoniacal influences, and ascribed to man the power of resisting every evil if he chose. These views, it is alleged, continued to be held, in substance, by the Christian teachers in the east, and were fully developed by Chrysostom; but Catholic writers maintain that in all this Chrysostom and the other Greek Fathers are speaking not of the natural powers of the will, but of the will as assisted by divine grace.

The doctrine took another shape in the Latin Church. Tertullian, following up his dogma of Traducianism, according to which the child derives not only its body but its soul from its parents, maintained that sinfulness had been propagated, along with mortality, from Adam to all mankind; he thus defended an *originis vitium*, without conceiving it as actual sin and denying all capacity for good in man. This view was followed by Cyprian, Ambrose, and even by Augustine in his earlier writings. It was only during his controversy with Pelagius and Cælestius that Augustine came to develop the doctrine of original sin into the full form given above. His great influence in the western churches procured the condemnation of his opponents, the Pelagians (q. v.), as heretics at the Councils of Carthage (412, 416, 418), although the Councils of Jerusalem and Diospolis (415) decided in their favour. Building upon the foundation of Traducianism, Augustine laid down that every natural man is in the power of the devil, and upheld the justice of this as a punishment for the share which the individual had in Adam's transgression; for as all men existed in the loins of Adam, all sinned with him. Pelagius, on the other hand, who rejected the Traducian theory, denied that sin is propagated physically, or that the fall of Adam has exercised any prejudicial influence on the moral constitution of his posterity; and maintained that all men are born in a state of innocence, possess the power of freewill, and may therefore live without sin. He and his followers objected to Augustine, that his doctrine was in direct contradiction to clear passages of Scripture, and that it made God the originator of evil and an unrighteous judge.

Great as was the respect for Augustine, the harshness of his doctrine was too shocking to the natural sentiments to meet with lasting acceptance. In the eastern church it never gained a footing, and even in the west it met with opposition. In Gaul, John Cassian, Faustus, Arnobius, and others, took up a view midway between the views of Augustine and Pelagius, from which they were called Semipelagians. They attributed to man a capacity for good which makes it possible for him, not indeed to merit the favour of God, but to make himself capable of receiving it; and maintained that it is only a certain inborn weakness that men inherit from the first pair. The Semipelagian doctrine found acceptance especially among the monks (in particular among the Franciscans), continued to prevail during the middle ages, and among the scholastics found partisans in the Scotists. Augustine's views also found advocates among the scholastic philosophers, who, however, added to it many limitations and explanations. Regarding the way

in which original sin is propagated, many held by the Traducian theory, while others conceived it to be a sort of infection of the soul by the defiled body, or an imputation of guilt to all partakers of the human nature. Petrus Lombardus adhered to Augustine. Anselm of Canterbury conceived original sin to be a want of requisite righteousness, and thought that this want was imputed to all the posterity of Adam, although not in the same degree as if they had themselves sinned. Anselm's view was adopted by Duns Scotus, while Bonaventura and Thomas Aquinas sought to combine the opinions of Anselm and Augustine. Anselm had thought that his theory afforded a better explanation of the sinless birth of Christ; and about the 12th c. it began to be maintained that Mary also was conceived without sin.

The reformers of the 16th c. everywhere made original sin a leading doctrine, and thus were enabled to combat effectively the Roman Catholic doctrine of the merit of works; while the Catholic Church, in the fifth session of the Council of Trent, stamped what the Calvinist school would call Semipelagianism as the orthodox doctrine. The reformed churches agreed with the Lutheran on the point of original sin. In this they followed Calvin rather than Zwingli, who looked upon it as an evil or disease, and as becoming sin only when a commandment is transgressed. The Arminians and Socinians, on the other hand, denied the doctrine of hereditary sin in the ecclesiastical sense. The Mennonites spoke of a loss of the divine image in consequence of the fall of Adam, but still asserted the freewill of man. The Quakers rejected the name of original sin altogether; they held that there is a germ of sin in man, from which imputable sin springs, and that, however corrupt, he has still the susceptibility of being awakened to the inward light. The whole Protestant Church held, besides, that Jesus alone was free from sin, both original and actual. The Roman Catholic Church ascribed this attribute also to Mary, though no public and distinct declaration on the point was given by the Council of Trent. See IMMACULATE CONCEPTION.

The harshness of the Augustinian dogma led, at the time of the Reformation, to keen controversies; Erasmus disputed the point with Luther, and would only admit a weakness of the freewill arising from original sin, and by no means a complete annihilation of it. From that time the doctrine in Germany continued to be variously attacked and defended. It has been discussed by the schools of philosophy. Kant shewed the moral signification of the dogma, and made out original sin to be a propensity to evil inherent in man. The Schelling-Hegel school, again, explained it as the finite nature with which the individual is born. In recent times, the theologians of the old Lutheran and strictly orthodox tendencies, such as Olshausen, Tholuck, Hengstenberg, and others, have come forward as adherents and defenders of the Augustinian doctrine; while the more liberal theologians modify it in various ways, not admitting any moral inborn corruption arising from the fall, but only a weakness in man's nature for the knowledge and performance of good. How far, and with what differences, the extreme Augustinian view is held by the churches of England and Scotland, will be seen from the following extracts from the *Thirty-nine Articles* and the *Westminster Confession of Faith*.

From Art. ix. of the *Thirty-nine Articles*: 'Original sin standeth not in the following of Adam (as the Pelagians do vainly talk); but it is the fault and corruption of the nature of every man, that naturally is engendered of the offspring of

any some, slew him with an arrow, because Eos, inflamed by his beauty, had carried him off to Ortygia, and thereby offended the gods. Others aver that Artemis, virgin-goddess though she was, cherished an affection for him, that made her brother Apollo fiercely indignant. One day, pointing out to her at sea a black object floating in the water, he told her that he did not believe she could hit it. Artemis, not recognising her favourite, drew her bow, and pierced him through the head; a third myth makes him find his death from the sting of a scorpion. Asklepios (*Æsculapius*) wished to restore him to life, but was slain by a bolt of Zeus. After his death, O. was placed with his hound among the stars, where, to this day, the most splendid constellation in the heavens bears his name.

ORISSA, an ancient kingdom of Hindustan, the authentic history of which goes back to 473 A.D., extended from Bengal—a part of which it included—on the N., to the banks of the Godavari on the S., and from the coast on the E. to the river Gondwana on the W. From its remains of sculptures, inscriptions, &c., we may infer that its early civilisation was high. The temple of the sun at Kanārek—erected about the 12th c.—exhibits carvings representing the planets, sculptured figures of animals, &c., which shew that at that date the plastic and mechanical arts were in a more advanced state in O. than they were in England. It maintained its position as an independent monarchy till 1553, when, its royal line having become extinct, it became an outlying province of the empire of the Great Mogul. On the breaking up of this empire, the more valuable portions of O. were seized by the Nizam of Hyderabad. The French, who had taken possession of a part of the country long known as the Northern Circars, attempted to drive the English (who had also formed commercial settlements on the coast), out of India. The result of the contest for supremacy in India between the French and English is well known. The Mahrattas, who had seized a portion of O. in 1740, were forced to surrender it to the English in 1803. The soldiers of the East India Company were marched into O. at the commencement of the present century, and an engagement was subsequently entered into between the Company and the native chiefs and princes, by which the former bound themselves to perform certain services for the country (as maintaining the river-banks in good repair), while the latter engaged to pay a yearly tribute. Of the many principalities into which O. was divided, a large number got into arrears with the government, and the result was that numbers of the estates were sold, and the government, as a rule, became the purchaser. Much of the territory originally forming a portion of this kingdom thus fell into the hands of the British. The ancient O., which existed as an independent monarchy for four centuries, and flourished as a principality of the Mogul empire after 1553, is now hardly to be recognised in the British dependency of Cuttack (q. v.), within the limits of which it is comprised. The country is traversed by a branch of the Eastern Ghats running parallel with the coast. The hill-districts, which nowhere present an elevation of more than 3000 feet, are inhabited by the Gonds, the Koles, the Sourahs, and the Khonds. The Khonds are believed to be the descendants of the aboriginal inhabitants of the country. This tribe occupied an area extending from north of the Mahanaddi, south to the banks of the Godavari. Their mountain-haunts are admirably suited for defence, as the districts which they inhabit are almost inaccessible; and although they do not yet appear to have adopted firearms, they manage their battle-

axes and bows and arrows with an adroitness and courage that make them formidable enemies. The Khonds are a totally distinct race from the inhabitants of the plains, and there is but little resemblance between them and the other hill-tribes, the Gonds and Sourahs. The chief peculiarities of the Khonds are, that their language, which is quite distinct from those of the neighbouring tribes, is not in the least understood by the inhabitants of the plains; and that human sacrifice formed, till within the last few years, one of the distinguishing features of their religion. They do not barter or traffic, and all commercial transactions are managed for the Khonds by the Panus, who are regarded by their employers as an inferior race. There are, however, no caste prejudices among the Khonds such as generally prevail throughout the plains of India. Agriculture and war are the only employments. The revolting custom of human sacrifice prevailed among the Khonds from the earliest times, although it was not till 1836 that the attention of the government was specially called to the subject, at the conclusion of an insurrection, in the course of which British officers had been brought into contact with the Hill tribes. The Khond victims, called Meriah, were always bought with a price, sometimes from families of their own tribes who had fallen into poverty, but generally kidnapped from the plains by miscreants of the Panu race. The Meriah victims were of both sexes, and of every age; though adults were held in the highest esteem, because, being the most costly, they were supposed to be more acceptable to the deity. The object of the sacrifice was to propitiate the earth-god; and abundant crops, security from calamity, and general prosperity were supposed to be insured to any one who had cut off a portion of the flesh of the human victim, and buried it in his farm. The consummation of the Meriah sacrifice was often attended with circumstances of the most revolting and disgusting cruelty. In some cases the event was preceded by a month's feasting, intoxication, and dancing round the Meriah. On the day before the sacrifice, the priest thus addressed the victim: 'We have bought you with a price, and did not seize you; now we sacrifice you according to custom, and no sin rests with us.' On the following day the victim was made senseless from intoxication, and then suffocated; after which the officiating priest cut a portion of the flesh from the body, and buried it as an offering to the earth-god. The people, following his example, hewed the flesh from the bones, and carried the bloody trophy to their distant villages, where it was buried. In many cases the victim was not intoxicated before sacrifice; but the joints of his arms and legs were broken with a hatchet, in order to prevent the possibility of resistance. In 1837, General (then Captain) Campbell was appointed assistant-collector in Ganjam, the adjoining district in the plains, and with varied success devoted much of his time to endeavouring to suppress the rite. He was succeeded in 1841 by Major (then Lieutenant) Macpherson, C.B. Encouraged by the success of his labours, the government in 1845 established, under Macpherson, a separate agency for the suppression of Meriah sacrifices in the Hill tracts of O., in which he was succeeded, in 1847, by Major-general Campbell, who carried on, with undiminished success, the good work commenced by Macpherson, pushing his inquiries and exerting his authority among tribes unvisited by his predecessor; and reports have been sent in from all parts of the country, stating that for several years hardly any Meriah sacrifices have taken place in the great Hill tract of Orissa. In the year 1852

ORLE, in *Heraldry*, one of the charges known under the name of *sub-ordinaria*, said to be the diminutive of a *Hordure* (q. v.), but differing from it in being detached from the sides of the shield. It may be the sole charge in a shield. Or, an *orie* gules was the coat borne by John Bahol. An *orie*



Orle.

of heraldic charges of any kind denotes a certain number (generally eight) of these charges placed in orle, as in the coat of the old Scottish family of Gladstones of that ilk; argent, a savage's head couped, distilling drops of blood proper, thereon a bonnet composed of bay and holly leaves all proper, within an orle of eight martlets sable.

ORLEANS, an important commercial town of France, capital of the department of Loiret, and formerly capital of the old province of Orleannais, which now forms the greater part of the departments of Loiret, Eure-et-Loir, and Loir-et-Cher, is situated on the right bank of the Loire, here crossed by a bridge of 9 arches, and is 75½ miles south south-west of Paris by railway. Close to the city is the Forest of O., one of the largest in the country, consisting of 94,000 acres, planted with oak and other valuable trees. O. stands on the verge of a magnificent plain sloping toward the Loire, and watered by the Loire and Loiret, and is surrounded on the land side by a wall and dry ditches, on either side of which there are pleasantly shaded boulevards. Around it are eight prosperous and populous suburbs. Among its principal buildings are the cathedral, with two lofty and elegant towers, one of the finest Gothic edifices in the country; the tower; bishops' residence; the houses of Joan of Arc, of Agnes Sorel, of Diane de Poitiers, of François I., of Pothier; the churches and hospitals, which are numerous; the *maison*, theatre, &c. The town contains three statues of Joan of Arc, of which the equestrian one was inaugurated in 1855. The situation of the town has many commercial advantages, arising from its position on a navigable river, on lines of railway which connect it with Paris and the great trading towns in the south of France, and on the canal which connects the Loire with the Seine. Manufactures of hosiery, cotton and linen goods, refiners' sugar, varnish, bleached wax, leather, &c., are carried on. The trade is chiefly in stockings, sheep-skins, wool, bran, corn, and sugar. Pop. 50,798.

The city was called *Genabum*, afterwards *Aurelian*, possibly from the Emperor Aurelian, of whom the modern name is only a corruption, was besieged by Attila in 451, but relieved by the Romans who were led by Aetius. It afterwards passed into the hands of the Franks, was taken by the Normans in 865, and again in 865. In 1428, it was occupied by the English under the Duke of Bedford, and was delivered from the besiegers by the heroic exertions of Joan of Arc (q. v.), who on this occasion is also named the Maid of Orléans. During the religious wars of the 16th c., O. suffered severely.

ORLEANS, HOUSE OF. See **BOURBON**.

ORLEANS, JEAN BAPTISTE GASTON, Duc d', third son of Henry IV. of France and Mary de Medici; was born at Fontenay-le-Comte, 23d April 1602.

He possessed tolerable abilities, but his education was neglected. On his marriage with Marie of Bourbon, Duchess of Montpensier, in 1628, he received the duchy of Orléans as appanage. His wife soon died, leaving one daughter, the celebrated Mademoiselle de Montpensier. His brother, Louis XIII., regarded him with dislike as heir-presumptive to the throne, the queen having no children; and the treatment which he received at the hands of the king and of Richelieu, led him to join with his mother in attempting the overthrow of that minister. He left the court with a number of other great nobles in February 1631; sought the support of the Duke of Lorraine, whose sister he married; and raised in the Spanish Netherlands a corps of 2000 men, at the head of which he crossed the French frontier, assuming the title of Lieutenant-general of the Kingdom; but was completely defeated by Marshal Schomberg at Castelnaudary, and fled to the Duke of Lorraine, whom he thereby involved in ruin. In 1634, however, he returned to the French court. Richelieu sought to have his marriage with Marguerite of Lorraine declared invalid, but after a long struggle, and much disputing among jurists and theologians, its validity was sustained. The duke was, however, again obliged to leave France in consequence of fresh intrigues against Richelieu. After Richelieu's death, a reconciliation was effected between him and his brother, the king, by the ministers Mazarin and Chavigny; and Louis XIII. appointed him Lieutenant-general of the kingdom during the minority of Louis XIV. Mazarin and the queen-mother, Anne of Austria, attempting to assume all power to themselves, the duke placed himself at the head of the Fronde (q. v.); but with his usual vacillating weakness and selfish sacrifice of his friends, soon made terms again with the court. Yet, when Mazarin returned from banishment in 1652, the duke again assembled troops for the Prince of Condé, upon which account, after the disturbances were ended, he was confined to his castle of Blois, where he died on 2d February 1666. He left three daughters by his second marriage.

ORLEANS, NEW. See **NEW ORLEANS**.

ORLEANS, PHILIPPE, Duc d', regent of France during the minority of Louis XV., was the son of Philippe, Duc d'Orléans, and the grandson of Louis XIII., and was born 4th August 1674. He possessed excellent talents, and made unusual attainments both in science and belles lettres; but his tutor, Cardinal Dubois (q. v.), did not scruple to minister to the strong passions of the young prince, and exercised a most pernicious influence over him. He gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, his daughter, by Madame de Montespan. He astonished and alarmed the court by protesting against his exclusion by the testament of Charles II. from all right of succession to the throne of Spain, and by the attention which he immediately began to give to military and political affairs. His military talents, however, led to his employment in the wars in Italy and in Spain; but his presence in Madrid after his exclusion was regarded with apprehension both by Philip V. and by Louis XIV. He had, indeed, formed the design of taking possession of the Spanish throne for himself. In consequence of this, he spent some years in complete exile from the court, and was much dreaded by it; spending his time in dissipated and vicious excesses, and in the cultivation of the arts and the study of chemistry. This study afforded a pretext to Madame de Montespan and her party for accusing him of poisoning the king and other members of the royal family, who died suddenly, and of a rapid succession, of malignant fever, &c.

The king refused an investigation which the duke demanded. Louis, having legitimised his sons, the Duke of Maine and the Count of Toulouse, appointed the Duke of Orleans only president of the regency and not regent, giving the guardianship of his youthful heir and the command of the household troops to the Duke of Maine; but all this was set aside at his death, and the Duke of Orleans became sole regent. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the regent's adoption of the schemes of Law (q. v.) led to disastrous results. Meanwhile, on the 26th August 1718, he held the celebrated *Lit de justice*, in which he prohibited the parliament of Paris from meddling with financial or political affairs, and declared the legitimised sons of Louis XIV. incapable of succeeding to the throne. Dubois, who still possessed an unhappy influence over his former pupil, became prime-minister, and eventually ruler of France; the regent, who was really a man of far higher abilities, neglecting all duties, and pursuing a course of profligacy almost unequalled in the worst instances of antiquity. His eldest daughter, the Duchess de Berry, followed his example, and brought herself to an early grave. Dubois, wishing to be made a cardinal, persuaded the regent to sacrifice the Jansenists, and to compel the parliament in 1722 to recognise the bull *Unigenitus* (q. v.). After the king's coronation, 15th February 1723, and the death of Dubois in August, the Duke of Orleans, although disliking public affairs, consented to become prime-minister; but died on the 2d December of the same year, physically exhausted by his incessant debauchery. The influence of his religious and other opinions, and the example of his immoralities, powerfully tended to promote that state of things which eventually produced the horrors of the French Revolution.

ORLEANS, LOUIS PHILIPPE JOSEPH, DUC D', born April 13, 1747, was the great-grandson of the preceding. He possessed very good abilities; but early fell into the grossest debaucheries, in which he continued to the end of his career. Louis XVI. disliked him on account of his debased character, and the queen for his obtrusiveness. He became gradually estranged from the court, sought popularity and obtained it, and embraced the cause of American independence. In the Assembly of Notables in 1787 he declared against the ministerial proposals; and when the king sought to overcome the resistance of the parliament by a *Lit de justice*, he protested against the proceeding. On the assembly of the States-General, he took the popular side, and voted with the extreme left in the National Assembly; seeking at the same time to please the populace by profuse expenditure, with the hope of being made Lieutenant-general of the Kingdom, or perhaps of opening for himself a way to the throne. When the insurrectionary movements began in Paris in 1789, he promoted them by secret agents and money. The court sent him on an ostensibly diplomatic mission to England, from which he returned after more than six months' absence, in July 1790, and unscrupulously engaged in new intrigues hostile to the king. But he began to find that he himself was made the mere tool of a party, who availed themselves of his influence and wealth for their own purposes, and this discovery cooled his revolutionary fervour. He withdrew from the Jacobin Club, was reconciled to the king, and appeared at court; but was treated with such disrespect by the courtiers, that he turned away, and from that time followed in blind rage the stream of the revolution. He joined Danton's party, was concerned in insurrections, disclaimed all pretensions

to the throne, renounced his titles, assumed the name of Philippe Egalité, was addressed as Citizen Egalité, and was returned by the department of Seine and Marne to the National Convention, in which he took his place among the Mountain party. He voted for the death of the king, being, it is said, himself threatened with death by the Jacobins if he should do otherwise, but alleging his sense of duty and his belief that every one who did anything contrary to the sovereignty of the people deserved death. The vote was received with a cry of disgust, and by no means increased the safety of his own position. The Mountain party were dissatisfied with him, because he did not give up the whole of his immense wealth for party purposes. After the desertion of his son, the Duke de Chartres (see LOUIS PHILIPPE), the decree for the imprisonment of all the Bourbons was applied to him. He was thrown into prison with his family in Marseille, and was brought before the tribunal of the department of Bouches de Rhône on a charge of high treason. He was acquitted, but the Committee of Public Safety immediately brought him before the Revolutionary Tribunal in Paris; and on the 6th of November 1793 he was condemned, and on the same day executed amidst the execrations of the multitude which had so often applauded him.

ORLEANS CLOTH, a kind of stuff made for ladies' dresses, in which the warp is of cotton and the weft of worsted. It is so called from having been first made at Orleans in France, but it is now extensively manufactured at Bradford in Yorkshire.

ORLOFF, or ORLOV, a Russian family that first rose to eminence during the reign of Paul III., when one of its members, Count Gregori O., attracted the notice of the Grand Duchess Catherine, afterwards the Empress Catherine II., and succeeded Poniatowski as her favourite. It was Gregori who planned the murder of Peter III., and his brother Alexis who committed the deed, and both received high honours and rich rewards for this and other services. The flourishing family of the Counts Bobrinski resulted from Gregori's intercourse with the empress. The legitimate line of O. soon became extinct; but Feodor, a brother of Gregori and Alexei, left four illegitimate sons, one of whom, Mikail, distinguished himself in the campaign of 1814; and another is Count Alexei O., the celebrated diplomatist. Count Alexei was born in 1787, signalled himself by courage and military talents during the French wars, negotiated the treaties of Adrianople (1829) and Unkiar-Skelessi (1833), and represented Russia at the London conference of 1832 on the affairs of Belgium and Holland. In 1844, he was placed at the head of the secret police; and the ability and energy with which he directed its vast machinery, rendered him the most dreaded official in Russia. He was high in the favour of the Emperor Nicholas, who employed him in the negotiations with Austria previous to the Crimean war. In 1856, he sat in the congress of Paris as the representative of Russia, and on his return was made president of the grand council of the empire. He died at St Petersburg, 20th May 1861.

ORLOP (Dutch, *overloop*, that which runs over, or covers), in ships of war, is the lowest deck, immediately above the hold. It contains the magazine, bread-room, and various store-rooms; and is used in time of action for the reception and treatment of the wounded, as, from being below the water-line, it is the safest part of the ship.

ORME'S HEAD, GREAT, a headland in the north-east of Caernarvonshire, North Wales, five miles north-north-west of Conway, is an enormous mass of limestone rock, surmounted by a

ORLE, in Heraldry, one of the charges known under the name of sub-ordinaries, said to be the diminutive of a Bordure (q. v.), but differing from it in being detached from the sides of the shield. It may be the sole charge in a shield. Or, an orle gules was the coat borne by John Baskin. An orle



Orle.

of heraldic charges of any kind denotes a certain number (generally eight) of these charges placed in orle, as in the coat of the old Scottish family of Gladstones of that ilk; argent, a savage's head couped, distilling drops of blood proper, thereon a bonnet composed of bay and holly leaves all proper, within an orle of eight martlets sable.

ORLEANS, an important commercial town of France, capital of the department of Loiret, and formerly capital of the old province of Orléannais, which now forms the greater part of the departments of Loiret, Eure et Loir, and Loir-et-Cher, is situated on the right bank of the Loire, here crossed by a bridge of 9 arches, and is 75½ miles south-south-west of Paris by railway. Close to the city is the Forest of O., one of the largest in the country, consisting of 94,000 acres, planted with oak and other valuable trees. O. stands on the verge of a magnificent plain sloping toward the Loire, and watered by the Loire and Loiret, and is surrounded on the land-side by a wall and dry ditches, on either side of which there are pleasantly shaded boulevards. Around it are eight prosperous and populous suburbs. Among its principal buildings are the cathedral, with two lofty and elegant towers, one of the finest Gothic edifices in the country; the tower; bishop's residence; the houses of Joan of Arc, of Agnes Sorel, of Diane de Poitiers, of François I., of Pothier; the churches and hospitals, which are numerous; the *musee*, theatre, &c. The town contains three statues of Joan of Arc, of which the equestrian one was inaugurated in 1855. The situation of the town has many commercial advantages, arising from its position on a navigable river, on lines of railway which connect it with Paris and the great trading towns in the south of France, and on the canal which connects the Loire with the Seine. Manufactures of woollery, cotton and linen goods, refined sugar, vinegar, bleached wax, leather, &c., are carried on, and the trade is chiefly in stockings, sheepskins, wine, brandy, corn, and sugar. Pop. 50,796.

O., originally called *Genabum*, afterwards *Aurelian* (probably from the Emperor Aurelian), of which the modern name is only a corruption, was besieged by Attila in 451, but relieved by the Romans, who here defeated Attila. It afterwards passed into the hands of the Franks, was taken by the Normans in 855, and again in 865. In 1428, it was besieged by the English under the Duke of Bedford, but was delivered from the besiegers by the inspiring exertions of Joan of Arc (q. v.), who on this account is also named the Maid of Orleans. During the religious wars of the 16th c., O. suffered severely.

ORLEANS, HOUSE OF. See Bourbon.

ORLEANS, JEAN BAPTISTE GASTON, Duc d', third son of Henry IV. of France and Mary de Medici; was born at Fontainebleau, 28th April 1602.

He possessed tolerable abilities, but his education was neglected. On his marriage with Marie of Bourbon, Duchess of Montpensier, in 1626, he received the duchy of Orleans as appanage. His wife soon died, leaving one daughter, the celebrated Mademoiselle de Montpensier. His brother, Louis XIII., regarded him with dislike as heir-presumptive to the throne, the queen having no children; and the treatment which he received at the hands of the king and of Richelieu, led him to join with his mother in attempting the overthrow of that minister. He left the court with a number of other great nobles in February 1631; sought the support of the Duke of Lorraine, whose sister he married; and raised in the Spanish Netherlands a corps of 2000 men, at the head of which he crossed the French frontier, assuming the title of Lieutenant-general of the Kingdom; but was completely defeated by Marshal Schomberg at Castelnaudary, and fled to the Duke of Lorraine, whom he thereby involved in ruin. In 1634, however, he returned to the French court. Richelieu sought to have his marriage with Marguerite of Lorraine declared invalid, but after a long struggle, and much disputing among jurists and theologians, its validity was sustained. The duke was, however, again obliged to leave France in consequence of fresh intrigues against Richelieu. After Richelieu's death, a reconciliation was effected between him and his brother, the king, by the ministers Mazarin and Chavigny; and Louis XIII. appointed him Lieutenant-general of the kingdom during the minority of Louis XIV. Mazarin and the queen-mother, Anne of Austria, attempting to assume all power to themselves, the duke placed himself at the head of the Fronde (q. v.); but with his usual vacillating weakness and selfish sacrifice of his friends, soon made terms again with the court. Yet, when Mazarin returned from banishment in 1652, the duke again assembled troops for the Prince of Condé, upon which account, after the disturbances were ended, he was confined to his castle of Blois, where he died on 2d February 1690. He left three daughters by his second marriage.

ORLEANS, NEW. See New Orleans.

ORLEANS, PHILIPPE, Duc d', regent of France during the minority of Louis XV., was the son of Philippe, Duc d'Orléans, and the grandson of Louis XIII., and was born 4th August 1674. He possessed excellent talents, and made unusual attainments both in science and belles lettres; but his tutor, Cardinal Dubois (q. v.), did not scruple to minister to the strong passions of the young prince, and exercised a most pernicious influence over him. He gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, his daughter by Madame de Montespan. He astonished and alarmed the court by protesting against his exclusion by the testament of Charles II. from all right of succession to the throne of Spain, and by the attention which he immediately began to give to military and political affairs. His military talents, however, led to his employment in the wars in Italy and in Spain; but his presence in Madrid after his victories was regarded with apprehension both by Philip V. and by Louis XIV. He had, indeed, formed the design of taking possession of the Spanish throne for himself. In consequence of this, he lived for some years in complete exile from the court, and much dreaded by it; spending his time both in vicious excesses, and in the cultivation of the fine arts and the study of chemistry. This study afforded a pretext to Madame de Montespan and her party for accusing him of poisoning the dauphin and others of the royal family, who died suddenly, and an rapid succession, of malignant fever, in 1711.

light-house, and forming the extreme point of the western shore of Orme's Bay. Lat. $53^{\circ} 20' N.$, long. $3^{\circ} 51' W.$ —Little Orme's Head forms the eastern extremity of the same bay.

ORMOLU is a variety of brass, consisting of zinc 25 parts, and copper 75 parts, which has a nearer resemblance in colour to gold than ordinary Brass (q. v.). It is extensively used for castings of ornaments for furniture, candelabras, and such articles. When the casting is made, its colour is brought out by a *pickle* of dilute sulphuric acid, after which the acid is removed by water, and a liquor varnish is put on to keep it from tarnishing.

ORMOND, JAMES BUTLER, DUKE OF, was the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. The family was of illustrious antiquity. Genealogical legend carried it back to the dukes of Normandy before the Conquest, and it is certain that at the dawn of the 13th c., it held the hereditary office of royal cup-bearer or *butler*, whence the family name.—The subject of the present article was born in London in 1610. His father, the son of the celebrated Walter, Earl of Ormond, was drowned in crossing the Channel; and the old earl having incurred the displeasure of the king, James I., and being thrown into prison, James, who on his father's death became, as Viscount Thurles, the heir of the title, was seized as a royal ward, and placed under the guardianship of the Archbishop of Canterbury. On the restoration of his grandfather to liberty, he also was released; and in his twentieth year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded, upon his grandfather's death, to the earldom and estates of Ormond. During the Strafford administration in Ireland, O. distinguished himself so much, that on Strafford's recall he recommended O. to the king; and in the rebellion of 1640, O. was appointed to the chief command of the army. During the troubled times which followed, he conducted himself with undoubted ability, although, as a necessary consequence of the numberless divisions and subdivisions of party which then prevailed in Ireland, he failed to satisfy any one of the conflicting sections; and when, in 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the royalist party in England. During the long contest of Charles with the parliament, O. continued to uphold the royal interest in his Irish government; and when the last crisis of the king's fortunes came, he resigned his Irish command, and retired to France, from which country he again returned to Ireland with the all but desperate design of restoring the royal authority, and after a gallant but unequal struggle, was compelled, in 1650, to return once more to France. His services to the royal cause continued unremitting during his exile; and at the restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormond. His after-life was less eventful, although he twice again returned to the government of Ireland. It was in 1679 that the well-known attempt was made by the notorious Colonel Blood (q. v.) upon the life of Ormond. As he was returning from a civic festival, he was attacked by Blood and a party of ruffians, and was dragged from his coach with the intention of his being hanged at Tyburn. The attempt drew additional interest from its being commonly supposed to have been instigated by the profligate Duke of Buckingham, O.'s inveterate foe. He escaped uninjured, and lived until the year 1688. His letters and other papers are full of deep historical interest. See *Carte's Life of Ormond*.

O'RMASKIRK, a market town of England, in Lancashire, in the centre of a rich and populous agricultural district, 12 miles north of Liverpool by the Lancashire and Yorkshire railway. The parish church has both a tower and spire. Its grammar-school has an annual income from endowment of £150. Silk-weaving, rope-making, basket-making, and brewing are the principal branches of industry. There are large collieries in the vicinity. Pop. (1861) 6426.

ORMUZ, or **HORMUZ**, a small island in the strait of the same name, at the entrance of the Persian Gulf, and within ten miles of the Persian coast. It is about twelve miles in circumference, and belongs to the Imaum of Muscat, who derives an income from the salt exported from the island. In the 16th c. it was taken by the Portuguese, and being made by them an entrepôt for goods from India, Persia, and Turkistan, it became important, and the town of the same name rose in population until it had 40,000 inhabitants. The town was demolished, in 1622, by Shah Abbās, assisted by the English, and its trade was removed to Gombroon (q. v.).

ORMUZD (Ahurmazd, Auramazda, Hormazd, Ormazd), corrupted from Ahurō-Mazdā, i. e., that Ahura (Vedic Asura) or 'Spiritual Being,' who is called Mazdā (i. e. Vedic Medhās) = 'Creator of all things;' the name of the supreme deity of the ancient Persians, and of their descendants the Guebres and Parsees. It was at first emphatically employed in this sense by Zoroaster, or Zarathustra Spitama. O. is, according to Zoroaster's original doctrine, the creator of the earthly and spiritual life, the lord of the whole universe, in whose hands are all creatures. He is the light and the source of light, the wisdom and the intellect, and is in the possession of all good things, such as 'the good mind,' 'immortality,' 'wholesomeness,' 'the best truth,' 'abundance,' &c.; which gifts he bestows upon the pure in thoughts, deeds, and words, while the wicked are punished by him according to their wickedness. ('For thou art through purity, the holy over the wicked, the ruler over all, the heavenly, the friend of both worlds, Mazdā! . . . Father of the pure creatures at the beginning, who hath created the way of the sun, of the stars, who causeth the moon to wax and to wane. . . . He holdeth the earth and the unsupported [heavenly bodies!], the waters and the trees, and giveth swiftness to the wind and the clouds. . . . The creator of the good mind, the working good, hath made light as well as darkness, sleep and waking, the morning dawns, the noons, the nights,' &c.—*Yazna*, 43.) Sprung from Zarvan-Akarana (the boundless time), i. e., being from eternity, self-existing, neither born nor created, he unites within himself—as does man and everything else existing—the two primeval principles of good and evil, the *Spento-mainyus*—i. e., the white, holy spirit; and the *Angrō-mainyus* (corrupted into Ahriman) = the dark spirit. This Zoroastrian conception of the two sides of the divine being—itsself one and indivisible—has, however, in the course of time, partly through misunderstandings and wilfully false interpretations, undergone important changes. While the Zervan-Akarana was transformed by the Magi—in opposition to the *Zendiks*—into the Supreme Being itself, the philosophical notion of a duality in O. became the theological dogma of god and devil, jealous of each other's power, bent upon the destruction of each other's works, and consequently in constant war with each other, they and their armies. Both are—according to this corrupted view of later times, by means of which the genuine one has been forgotten up to our day—supreme rulers; both have their fixed number of councillors (sprung from

an egg, *Plut. Isis and Osiris*), who are the actual governors of the whole universe, each in his special province; which councillors, however, are neither more nor less than certain abstract ideas of Zoroaster. One personal archangel alone is assumed by the latter, viz. *Sraosha* (*Serosh*, cf. Sanscr. *Shruti*), i. e. hearing, tradition. He is vested with very high powers, and stands between O. and man; he is the teacher of good religion; he shows the way to heaven, and pronounces judgment over human actions after death. He is the personification of the whole divine worship and its outward manifestations, the symbols, prayers, sacrifices, rites, &c., and the chief combatant of the influence of the Devas; who stand symbolically for the Brahmanic religion. O. is represented as sitting upon a throne of light, as a venerable man, or seated upon a bull, &c.—For further particulars about the seasons and the manner of his worship, as well as the general relations between his and the Brahmanic religion (both the result of a prehistoric conflict between the Iranians and those Arian brother-tribes who immigrated into Hindustan Proper), we must refer to *PARSHKEH, PERSIA, and ZOROASTER*.

ORNAMENTATION, or **DECORATION**, in Architecture, applies to something which is added to the simple constructive features, or to the form given to those features, for the purpose of making them beautiful or elegant. Thus, the Doric shaft, while answering the constructive purposes of a simple square or round pier, is ornamented with fluting; and its capital, with its beautifully proportioned echinus and abacus, supports as a plain slab would do the weight of the entablature. The other classic orders illustrate this in a richer manner. Thus, the Corinthian column, with its fluted and elegant shaft, resting on an ornamented base, and crowned by an ornamented capital, takes the place of what might have been, had utility alone been consulted, a plain pier of rubble-work, with a rough stone to rest upon, and another on the top to receive the load.

In classic architecture, as in every good style, the same principle pervades all the ornamental features—viz., that they are constructive features ornamented in a manner suitable to their use; for instance, a column being a member for support, should be of such a form as to denote this—the constructive use of a cornice being to protect the top of the wall, and to shield the front of it from the rain and sun, it should be made of such a form as to do this, and also to look as if it did it—to express its purpose. In classic architecture, the cornice consists of several members, in which the constructive decoration is well seen; the mutules and modillions beautifully indicating in an ornamental manner their original use, while the leaf enrichments of the small mouldings give life and animation to the building. In mediæval art the same principle prevails in a much greater degree, and over a more complex system of construction. The shafts, with their elegant and purpose-like bases and caps, are arranged so that each supports a separate member of the vaulting. The arch mouldings are divided so as to indicate the rings of their constructive formation. The buttresses, so elegant in outline, express the part they serve in supporting the vaulting; the pinnacles, with their ornamental finials, are the decorated dead-weights which steady the buttresses. The foliage and smaller ornament is also beautifully and suitably applied, as the growth and vegear of the supporting capitals and corbels, and the running foliage of the string-courses, arch-mouldings, &c., fully illustrate.

There are, no doubt, many styles of art to which these remarks can hardly be said to apply; as, for

example, the Assyrian, Egyptian, and Hindu styles, where we find many features applied in a manner meant to be ornamental, although actually contrary to their constructive use. In these styles (and also in Greek architecture), human figures, bulls, and other animals are placed as columns to carry the weight of a superincumbent mass. This is evidently wrong in principle, except when the figure is placed in an attitude to indicate that he is supporting a weight, as the Greek *Atlantes* do; but in the former cases religious notions seem to have overcome true artistic feeling. There are also many forms of ornament used in all styles, the origin of which is obscure, and their advantage doubtful; such are the zigzag, chevron, billet, &c., so common in early mediæval art, and the scrolls of Ionic and Indian art, and the complications of the interlacing work of the North in the middle ages. Such things may be admissible in coloured decoration, such as the confused patterns of Saracenic art, and the shell-patterns of Indian art; but where ornamental form is wanted, unless the requirements of the construction are carefully followed as the guide to the decoration, all principle is lost, and the ornament runs wild. This has frequently occurred in the history of art, and in no case more markedly than in the art of the Renaissance.

The material in use must also have an influence on the form and style of the ornament. Thus, stone-carving and metal-work must evidently require different treatment. Fac-simile leaves might be formed in iron, but could not be so carved in stone. This constructive element should be carefully attended to in designing. All imitative art must be to some extent conventional. Natural objects, such as leaves, flowers, &c., cannot be copied absolutely literally; and in suiting the conventional treatment to the nature of the material used, lies the great skill of the artist.

ORNE, a department of France formed out of the old provinces of Normandy and Perche, is separated on the north from the English Channel (*La Manche*) by the department of Calvados. Area, 1,506,727 acres, more than one-half of which is cultivable land; pop. (1862) 423,350. A range of wooded hills, nowhere rising above 1370 feet, extends across the south of the department from east to west. North of this range the surface slopes toward the English Channel; south of it, toward the Atlantic. The principal rivers are the Orne (which gives name to the department), the Rille, the Sarthe, and Huise. The climate is damp, though in general temperate, and the winters are severe. The soil is fertile, but agriculture is not in an advanced state. The inhabitants consume one-third more grain produce than is grown on the land. There are several millions of apple and pear trees planted along the roads, &c., and cider is extensively made. Cattle, and horses of the purest Norman breed, are reared. Mining is an important branch of industry; the chief products are iron and copper; marble, granite, and other stones for building are quarried. The department is divided into four arrondissements, Alençon, Argentan, Domfront, and Mortagne; capital, Alençon.

ORNITHOLOGY (Gr. *ornis*, a bird, and *logos*, a discourse), that branch of zoology of which the subject is birds. By Aristotle, Pliny, and others of the ancients, this study was prosecuted to some extent, along with other parts of natural history; but it is only in modern times that ornithology has assumed the rank of a distinct branch of science. The first modern author to attempt a scientific classification of birds seems to have been Pierre Belon, noted also as an ichthyologist, whose *Historia*

Avium was published about the middle of the 16th century. Some of his classes are very heterogeneous assemblages; but the first three, viz., Birds of Prey, Web-footed Birds, and *Grallæ*, are so natural as to have been acknowledged, with some modification of their limits, in all subsequent systems. In the 17th c. much progress was made in the observation and description of species, not only of the birds of Europe, but of other parts of the world. In the latter part of the century, attention began to be given to the anatomy of birds. An ornithological system, more perfect than that of Belon, was proposed by Willughby about 1676, and afterwards matured and improved by Ray. On this system that of Linné was founded. During the 18th c., the progress of ornithology was very rapid. The birds of many countries were described in works specially devoted to them, and the habits of birds began to be carefully observed; but the system of Linné, as framed by him before the middle of the century, continued to prevail almost unmodified till the publication of Cuvier's *Règne Animal* in 1817. Latham, Lacépède, Illiger, Temminck, and others, had indeed previously proposed systems more or less different from it; and systems have since been proposed by others, particularly by Mr Vigors and Mr Swainson, who have endeavoured to accommodate the classification to certain first principles which they supposed to pervade nature, but which other naturalists in general regard as fanciful. The system of Cuvier is now generally received by ornithologists, as that of Linné formerly was; not, however, without modifications, by which it has been sought to accommodate it to the progress of science, and some of the names introduced by other authors have obtained very general acceptance. The system of Linné divided birds into six orders—*Accipitres*, *Picæ*, *Anseres*, *Grallæ*, *Gallinæ*, and *Passeres*. That of Cuvier also divided them into six orders—*Birds of Prey* (the *Accipitres* of Linné, now often called *Raptores*), *Passerine Birds* (*Passerina*, now more generally called *Insectores*, or *Perching Birds*, including most of the Linnean *Passeres*, and part of *Picæ*), *Climbers* (*Scansores*, part of the Linnean *Picæ*, and often designated *Zygodactyli* or *Zygodactylous Birds*), *Gallinaceous Birds* (now often called *Rasores*, the Linnean *Gallinæ*, but including also the pigeons or *Columbidæ*, which Linné placed among *Passeres*), *Stilt-birds*, often called *Waders* (*Grallatores*, the Linnean *Grallæ*), and *Web-footed Birds* (*Palmipeles*, now also known as *Natatores* or *Swimmers*). These orders are noticed in separate articles. Perhaps the most important modification of Cuvier's system which has been proposed, is the separation of the *Brevipennes* or *Struthious Birds* from *Grallæ*, and their formation into a distinct order, sometimes called *Cursores* or *Runners*; and next to this may be mentioned the proposed separation of *Columbidæ* from Gallinaceous Birds.—The progress of ornithology since the commencement of the 19th c. has been very rapid; every department of it has been assiduously cultivated, and many of the works published have been not only of great merit, but very sumptuous and beautiful. The works of Audubon and Gould perhaps merit particular notice.

ORNITHORHYNCHUS. See DUCK-BILL.

OROBANCHÆÆ, or **OROBANCHACEÆ**, a natural order of exogenous plants, all herbaceous, and destitute of true leaves, but having their stems covered with brown or colourless scales. They all grow parasitically upon the roots of other plants. The calyx is divided, persistent, inferior; the corolla monopetalous, hypogynous, and irregular. The stamens are four, two long and two short; the ovary 1-celled, seated in a fleshy disc, composed of

two carpels, with one style. The fruit is capsular, enclosed within the withered corolla, 1-celled, 2-valved. The seeds are numerous, and very minute.



Broom-rape (*Orobancha rubra*):

a, the top of the stem, with bracts and flowers; *b*, the base of the stem, with scales; *c*, the corolla, cut open, shewing stamens; *d*, the middle segment of the lower lip of the corolla, magnified, shewing the beautiful fringe of gland-bearing hairs; *e*, capsule.

There are about 120 known species, natives chiefly of temperate climates, and generally characterised by astringency and bitterness, upon account of which some of them have been used in medicine (see CANCER ROOT). Eleven species are natives of Britain, chiefly belonging to the genus *Orobancha*, or **BROOM-RAPE**; to some of which important medicinal virtues were once erroneously ascribed. The enlarged base or rootstock of a species of *Orobancha* is cooked or dried, and eaten by the Indians of the north-western parts of America.

O'ROBUS, a genus of plants of the natural



Bitter Vetch (*Orobus tuberosus*):

a, standard of the corolla.

order *Leguminosæ*, suborder *Papilionaceæ*, allied to Vetches, and sometimes called **BITTER VETCH**; the

style linear, downy beneath the stigma; the calyx obscure at the base and oblique at the mouth; its upper segments deeper and shorter; the pod 1-celled, 2-valved; the leaves pinnate, without tendrils. The species are perennial herbaceous plants, chiefly natives of Europe. They afford good food for cattle. Two are natives of Britain, of which the most common is *O. tuberosus*, whose racemes of purple flowers often adorn heaths and bushy places, especially in hilly districts. The stem is unbranched, erect, about a foot high, with narrow membranous wings; the leaflets in 2-4 pairs; the pods long, cylindrical, black; the root creeping and swelling out into tubers at irregular intervals. The tubers have a sweet taste, resembling that of liquorice, and are sought after by children; they are also bruised and steeped in water in some parts of the Highlands of Scotland to make a fermented liquor, and a kind of liquor is made by steeping them in whisky; they are well-flavoured and nutritious when boiled or roasted, and are used in this way in the Highlands of Scotland, in Holland, Belgium, and other countries.

ORONTÉS, the ancient name of a river in Syria, now called *Nahr-el-Asi*. It rises in the highest part of Cœle-Syria, near Baalbek, flows northward between the mountains of Libanus and Anti-Libanus, as far as the city of Antioch, and then westward to the Mediterranean Sea, after a course of 240 miles, passing by a cross valley, through the mountains of the Syrian coast. Its lower course is remarkably beautiful, surpassing everything else that can be seen in Syria. Its rocky banks are 300 feet high, and the windings of the river shew them off to the greatest advantage. Myrtle-bushes, laurels, figs, wild vines, arbutus, dwarf-oaks, and sycamores (*Acer pseudo-platanus*) are scattered about in picturesque confusion. Here and there the eye catches a glimpse of some cavern mouth or ivy-matted precipice, while from the abyss beneath sounds for ever the roar of the impatient stream. The country through which it flows is of great fertility, and in many parts is richly cultivated.

OROSIUS, PAULUS, a Spanish presbyter and historian, was born at Tarragona, and flourished in the early part of the 5th century. He went to Africa about 413 A.D., where he made the acquaintance of St Augustine, and thence to Palestine, to study under St Jerome, then living at Bethlehem. He finally settled in Africa, but the date of his death is unknown. His chief work, the *Historiarum adversus Paganos Libri* 7, begins with the creation and goes down to 417 A.D. It is apologetic in design, being intended to refute the notion then current among the pagans, that the misfortunes of the Roman Empire and the wretchedness of the great masses were owing to the anger of the gods at the abandonment of their worship, and the profanation of their altars. The work is a trivial, inaccurate, uncritical miscellany of facts, culled from such second-rate authorities as Justin and Eusebius; the style is elegant, but also, as Bacon says, 'watery.' Yet it has obtained a place in literature from being a favourite text-book of universal history during the middle ages, and had the honour of being translated into Anglo-Saxon by our own Alfred. Some manuscripts bear the puzzling title of *Historia* or *Ormistia*, conjectured by some to be a corruption of Or. M. ist.; that is, *Universal History* (Orosius's History of the World). The editio princeps of the work appeared at Vienna in 1471; the best edition is that of Havercamp (Lag. Bat. 4to, 1738). Other writings of O.'s are *Libri Apologetici de Arbitrii Libertate*, an anti-Pelagian treatise, *Commonitorium ad Augustinum*,

an explanation of the state of religious parties in Spain in his time. See Möriener's *De Orosii Vita ejusque Historiarum Libri Septem adversus Paganos* (Berl. 1844).

OROTAVA, a town on the north coast of Teneriffe, one of the Canary Islands, is situated below the Peak, in one of the most fertile, pleasant, and healthy districts in the world. It contains several beautiful churches, the residence of the governor and the citadel. Fishing is carried on to some extent, and there is a trade in wine. Pop. 8628.

ORPHEUS (supposed to be the Vedic Ribhu or Arbhu, an epithet both of Indra and the Sun), a semi-mythic name of frequent occurrence in ancient Greek lore. The early legends call him a son of Apollo and the muse Calliope, or of Oëagrus and Clio, or Polymnia. His native country is Thracia, where many different localities were pointed out as his birthplace—such as the Mounts of Olympus, and Pangæus, the river Enipeus, the promontory of Serrhium, and several cities. Apollo bestows upon him the lyre, which Hermes invented, and by its aid O. moves men and beasts, the birds in the air, the fishes in the deep, the trees, and the rocks. He accompanies the Argonauts in their expedition, and the power of his music wards off all mishaps and disasters, rocking monsters to sleep and stopping cliffs in their downward rush. His wife, Eurydice (? = Sanscr. Uru, Dawn), is bitten by a serpent (? = Night), and dies. O. follows her into the infernal regions; and so powerful are his 'golden tones,' that even stern Pluto and Proserpina are moved to pity; while Tantalus forgets his thirst, Ixion's wheel ceases to revolve, and the Danaïdes stop in their wearisome task. He is allowed to take her back into the 'light of heaven,' but he must not look around while they ascend. Love or doubt, however, draw his eyes towards her, and she is lost to him for ever (? = first rays of the sun gleaming at the dawn make it disappear or melt into day). His death is sudden and violent. According to some accounts, it is the thunderbolt of Zeus that cuts him off, because he reveals the divine mysteries; according to others, it is Dionysius, who, angry at his refusing to worship him, causes the Menades to tear him to pieces, which pieces are collected and buried by the Muses in tearful piety at Leibethra, at the foot of Olympus, where a nightingale sings over his grave. Others, again, make the Thracian women divide his limbs between them, either from excessive madness of unrequited love, or from anger at his drawing their husbands away from them. Thus far legend and art, in manifold hues and varieties and shapes, treat of O. the fabulous. The faint glimmer of historical truth hidden beneath these myths becomes clearer in those records which speak of O. as a divine bard or priest in the service of Zagreus, the Thracian Dionysius, and founder of the Mysteries (q. v.); as the first musician, the first inaugurator of the rites of expiation and of the Mantic art, the inventor of letters and the heroic metre; of everything, in fact, that was supposed to have contributed to the civilisation and initiation into a more humane worship of the deity among the primitive inhabitants of Thracia and all Greece: a task to which O. was supposed to have devoted his life after his return with the Argonauts. A kind of monastic order sprang up in later times, calling itself after him, which combined with a sort of enthusiastic creed about the migration of souls and other mystic doctrines a semi-ascetic life. Abstinence from meat (not from wine), frequent purifications and other expiatory rites, incantations, the

wearing of white garments and similar things—not unlike some of the Essenic manners and customs—were among their fundamental rules and ceremonies. But after a brief duration, the brotherhood, having first, during the last days of the Roman empire, passed through the stage of conscious and very profitable jugglery, sank into oblivion, together with their 'orpheotelistic' formulas and sacrifices, and together with the joys of the upper, and the never-ending punishments of the infernal regions which they held out to their rich dupes: according to the sums they grudged or bestowed upon them.

O. has also given the name to a special literature called the Orphic, the real origin of which, however, is (according to Ottfried Müller), like Orpheus's own history, 'unquestionably the darkest point in the entire history of early Greek poetry.' Like Olen, Linus, Philammon, Eumolpus, Musæus, and other legendary singers of prehistoric Greece, O. is supposed to have been 'the pupil of Apollo and the Muses,' and to have first composed certain hymns and songs used in the worship of a Dionysius, dwelling in the infernal regions, and in the initiations into the Eleusinian mysteries. A mere 'abstraction,' as it were, he was called the first poet of the heroic age, and though not mentioned before Ibycus, Pindar, Hellanicus, and the Athenian tragedians, he was yet placed anterior to both Homer and Hesiod. The fragments current under his name were first collected at the time of the Pisistratidæ, chiefly by Onomacritus, and these fragments grew under the hands of the Orphic brotherhood, aided by the Pythagoreans, to a vast literature of sacred mythological songs sung at the public games, chanted by the priests at their service, worked out for dramatic and pantomimic purposes by the dramatists, commented upon, philosophised upon, and 'improved' by grammarians, philosophers, and theologians. Although authorities like Herodotus and Aristotle had already combated the supposed antiquity of the so-called Orphic myths and songs of their day, yet the entire enormous Orphic literature which had grown out of them retained its 'ancient' authority, not only with both the Hellenists and the church fathers of the 3d and 4th centuries A.D. (who, for their individual, albeit opposite purposes, referred to it as the most authentic primitive source of Greek religion, from which Pythagoras, Heraclitus, Plato had drawn their theological philosophy), but down almost to the last generation, when it was irrefutably proved to be in its main bulk, as far as it has survived, the production of those very third and fourth centuries A.D., raised upon a few scanty, primitive snatches. The most remarkable part of the Orphic literature is its Theogony, which is based mainly on that of Hesiod, with allegorising and symbolising tendencies, and with a desire to simplify the huge Olympian population by compressing several deities into a single one. See THEOGONY. Yet there is one figure which stands out here prominently—viz., Zagreus, the horned child of Zeus by his own daughter Persephone, who, killed by the Titans at the bidding of Here, is reborn by Semele as Dionysius.

Besides the fragments of the Theogony which have survived, imbedded chiefly in the writings of the Neoplatonists, are to be mentioned the *Argonautica*, a poem of the Byzantine period, consisting of 1384 hexameters; further, a collection of 87 or 88 liturgical hymns; a work on the virtues of stones, called *Lythica*, &c. Other poems belonging to the Orphic Cycle, of which, however, only names have survived in most instances, are *Sacred Legends*, ascribed to Cercops; a Poem on Nature, called *Physica*, probably by Brontinus; *Bacchica*, supposed to be written by Avignota, the daughter

of Pythagoras; *Minyas*, or Orpheus's descent into the Hades; and other poetical productions by Zopyrus, Timocles, Nicias, Persinus, Prodicus, &c. The best edition of the Orphic fragments is that of G. Hermann (Leipzig, 1805). The hymns have repeatedly been translated into English by T. Taylor and others. The chief authority on the Orphic literature still remains Lobeck's *Aglaophamus*.

O'RPIMENT. See ARSENIC.

O'RRERY, a machine constructed for the purpose of exhibiting the motions of the planets round the sun, and of the satellites round their primaries, which was in high repute during the 18th and beginning of the 19th centuries, though now regarded as a mere toy. It was a combination of the old *Planetarium* (q. v.), with other machines which shewed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an orrery is in some degree useful as giving a general notion of the way in which the planetary motions are performed. As it was a favourite machine at one time, a description of it may not be uninteresting. A number of iron tubes equal in number to the planets, and of different dimensions, are placed one within the other; their lengths being arranged so that the innermost tube projects at both ends beyond the one next to it, that one similarly projects beyond the third, and so on. At one end of each tube a rod is fixed at right angles, and a ball or lamp attached to its end; the lengths of the rods being proportional (or at least supposed to be so) to the radii of the planetary orbits. The other ends of the tubes form the axes of toothed wheels, which are connected either directly, or by means of combinations of toothed wheels, with a winch. The several combinations of wheels are so adjusted that the velocity of revolution of the rods is proportional to the times of revolution of the planets. On turning the winch the whole apparatus is set in motion, and the balls or lamps (representing the planets) revolve round the centre, which is a fixed lamp (representing the sun), at different distances, and with varying velocities. There are many nice arrangements, such as for producing elliptic motion, but these need not be described.

O'RRIS ROOT (probably a corruption of *Iris* Root), the rootstock (*rhizome*) of certain species of *Iris* (q. v.), natives of the south of Europe, belonging to the division of the genus having bearded flowers, sword-shaped leaves, and scapes taller than the leaves; viz. *I. Florentina*, a species with white flowers; *I. pallida*, which has pale flowers; and *I. Germanica*, which has deep purple flowers. The flowers of all these species are fragrant. *I. Germanica* extends further north than the other species, and its root is sometimes said to be more acrid. O. R. was formerly used in many medicinal preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. Its chief use is in perfumery. It has a pleasant smell of violets, which it acquires in drying. Hair and tooth powders, and oils, are often scented with it. A tincture of it is also used as a scent, and is often sold as *Essence of Violets*.

ORSINI, FELICE, an Italian revolutionist, who is destined to be remembered for his atrocious attempt on the life of the French emperor, Napoleon III., was born at Meldola, in the States of the Church, in 1819. The son of a conspirator, O. at an early age was initiated into secret societies, and before he had reached his twentieth year, he

the words spoken, to find out what letters they are to be represented by. This circumstance presents great difficulty to foreigners in the acquisition of English; which, in other respects, is one of the simplest and most easily learned languages in the world. The orthography of English is only to be acquired by observation and practice. There are no rules in the proper sense of the word; the only effective assistance that can be given in this matter is to bring together, under some kind of classification, the words that are most frequently misspelled. See PHONETIC WRITING.

ORTHOPTERA (Gr. straight-winged), an order of mandibulate insects, in many respects resembling the *Coleoptera* (q. v.), but having the wing-covers softer and generally leathery and flexible. The wing-covers also often overlap on the back when at rest, or meet at an angle like the roof of a house. The wings are broader than the wing-covers, and fold in a fan-like manner. A few species are wingless. The body is generally elongated. The antennae are almost always filiform and many-jointed. The eyes are usually very large, and there are also in most species two or three stemmatic eyes. The mouth much resembles that of the *Coleoptera*, but the maxillae are terminated by a horny denticulated piece, and covered by a *galea*; and the interior of the mouth exhibits a distinct fleshy piece, which some regard as a kind of tongue. The *O.* undergo only a semi-complete metamorphosis, the larva and pupa much resembling the perfect insect, except in the want of wings; which, however, begin to be developed in the pupa. The Earwig family differs so much from the other *O.* as to have been constituted by some entomologists into a distinct order. See **EARWIG**. The *O.* are divided into two sections, *Cursoria* and *Saltatoria*; the first with legs adapted for running, as the Mantis family, Spectre Insects, Walking Sticks, Leaf Insects, &c.; the second having the hinder legs very large and strong, generally adapted for leaping, as Grasshoppers, Locusts, Crickets, &c.

ORTOLAN (*Emberiza hortulana*), a species of Bunting (q. v.), much resembling the Yellow Hammer, and not quite equal to it in size. The

It frequents bushy places, but often makes its nest on the ground in cornfields, particularly where the soil is sandy. No bird is so highly esteemed by epicures, and vast numbers are used for the table. It is taken chiefly by nets, with the aid of decoy-birds, and after being taken is fattened on millet and oats, in rooms dimly lighted by lamps. Thus treated, it becomes excessively fat, sometimes so as to die of obesity; and attains a weight of three ounces. Great numbers of ortolans, potted and pickled, are exported from Cyprus.

ORTONA, a town of Naples on the Adriatic, in the province of Chieti (Abruzzo Citra), and 14 miles east of the town of that name. It gives title to a bishop, and contains a cathedral and other religious edifices. Its port has ceased to exist, and vessels are now obliged to anchor about a mile from the town in unsheltered roads, where, however, the water is deep and the bottom good. Wine is extensively grown, and has a local reputation as the best in this part of Italy. Pop. about 7000.

ORTYX. See **VIRGINIAN QUAIL**.

ORVIETO, a city of Central Italy, capital of the delegation of the same name, which was formerly included in the Papal States, but now forms part of the Kingdom of Italy, stands on the right bank of the Paglia, 8 miles north-east of Lake Bolsena, and 60 miles north-north-west of Rome. It occupies a strong position on a steep hill, is well built, and is surrounded with walls. It has been the seat of a bishop since 509 A. D. The cathedral, a beautiful specimen of the Italian Gothic, and one of the most richly-decorated edifices in Italy, is built of black and white marble, was begun in 1290, and completed about the middle of the 14th century. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior is also magnificently decorated with sculptures and paintings. The other chief buildings are St Patrick's Well, and several palaces. Pop. 6336, who trade in corn, cattle, and silk, and a delicate white wine, which is highly esteemed at Rome.

O., called in the time of the Longobards *Urbs Vetus*—of which its present name is a corruption—has been the place of residence and retreat in turbulent times of upwards of 30 popes. The city is evidently of Etruscan origin, but of its early history nothing is known.

ORYX, the name given by the ancients to a species of antelope, a native of the north of Africa.

Ortolan (*Emberiza hortulana*).

adult male has the back reddish brown, the wings dusky black and rufous brown; the tail dusky black, some of the outer tail-feathers with a patch of white on the broad inner web; the chin, throat, and upper part of the breast yellowish-green; the other under parts reddish buff-colour. The plumage of the female is of less vivid hues. The *O.* occurs in great flocks in the south of Europe and north of Africa. Even in the south of Europe it is a summer bird of passage, but its migrations extend as far north as Lapland, although in Britain it is a very rare bird, and only of accidental occurrence. It has no song, but merely a monotonous chirping note.

Oryx.

It is often represented on the monuments of Egypt, and as these representations are almost always in profile, it is generally made to appear as having

Samnites from the hilly districts to the north overran the country, and amalgamated with the inhabitants whom they had subjugated. It is conjectured that the conquerors were few in numbers, as (like the Normans in English history) they adopted in time the language of the conquered, but whether they modified the original Oscan language, and if so, to what extent, cannot now be ascertained. As it was these Samnitic Oscans or Campanians who formed that Samnitic people with whom both the Greeks of Lower Italy and the Romans first came into contact, the names *Osci* and *Oscan language* were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italic tongue. The territory where it was spoken comprised the countries of the Samnites, Frentani, Northern Apulians, Hirpini, Campani, Lucani, Bruttii, and Mamertini, whose dialects only slightly differed from each other; besides the entire Samnitic races, whence the language is sometimes called Samnitic or Safinic. The races situated north of the Silarus were purely Samnitic; those south of it, and even of the region round the Gulf of Naples, were Græco-Samnitic. The use of the national Samnitic alphabet was confined to the former. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (88 B.C.), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (1st c. B.C.) it was still used by the people, and as late as the destruction of Herculaneum and Pompeii was spoken by a few individuals. During its most flourishing period it was something more than a country *patois*; it is even possible that the Oscans had a literature and art of their own, which may not have been without influence on the early Calabrian poets, Ennius and Pacuvius, and the Campanian Lucilius. At any rate, we certainly know of a poetic creation peculiar to the Campanians, a kind of unwritten, regular, probably improvised farce, with fixed parts and changing situations, which was transplanted to Rome about 304 B.C., but was imitated there not in Oscan but in Latin. See ATELLANÆ. Besides a considerable number of coins with Oscan legends, there are still extant a number of inscriptions in the Oscan tongue, among which the most important for linguistic purposes are, 1st, the *Tabula Bantina*, a bronze tablet found in the neighbourhood of Bantia (on the borders of Lucania and Apulia), referring to the municipal affairs of that town; 2d, the *Cippus Abellanus*, or Stone of Abella (in Campania); and 3d, a bronze tablet found near Agnone, in Northern Samnium. See Mommsen's *Oskische Studien* (Berlin, 1845), and *Die Unteritalischen Dialekte* (Leip. 1850); also Friedländer's *Die Oskischen Münzen* (Leip. 1850), Kirchhoff's *Das Stadtrecht von Bantia* (Berl. 1853), and Donaldson's *Varronianus* (pp. 104-138).

OSCULATION AND OSCULATING CIRCLE (Lat. *osculari*, to kiss). One curve is said to osculate another when several points are common to it with the other, and the degree of osculation is said to be high or low according as the number of points in contact are many or few. The number of possible points of contact is determined by the number of constants contained in the equation to the tangent curve (supposing the number of constants in the equation to the curve which is touched to be greater). The same is true of a straight line and a curve. The equation to a straight line being of the form $ax + b$, contains two constants, a and b , hence a straight line can coincide with a curve in two contiguous points, and the contact is said to

be of the first order. This straight line is the tangent at the point of contact. When a straight line, not a tangent, meets a curve, there is no 'contact' but 'section,' as in that case only one point is common to the straight line and the curve. The equation to a circle contains three constants, and therefore a circle can have three consecutive points in common with a curve, and the contact is then of the second order. This circle is known as the 'circle of curvature,' or the osculating circle (see Fig. of article CURVATURE), and has for its radius the radius of curvature of that portion of the curve with which the circle is in contact. No other circle can have so high a degree of contact with a curve at any point as the osculating circle at that point.

O'SHKOSH, a town in Wisconsin, U.S., on both sides of the Fox River, at its entrance to Lake Winnebago, 90 miles north-north-east of Madison. It has a large lumber trade, saw-mills, planing-mills, steam-boats, &c. Pop. (1860) 6086.

OSIANDER, ANDREAS, one of the most learned and zealous of the German reformers, was born in 1498, at Gunzenhausen, near Nürnberg. His father was a blacksmith, called Hosemann, out of which name his son, after the fashion of his time, manufactured the classic-looking Osiander. O. was educated at Ingolstadt and Wittenberg; and after completing his course of study, became a preacher at Nürnberg, where he was conspicuously active in introducing the Reformation (1522). He ardently advocated the views of Luther in his controversy with the Swiss reformer Zwingli, on the question of the Lord's Supper. He took part in the conference held at Marburg (1529), and was present at the diet of Augsburg (1530). In 1548 he was deprived of his office as preacher at Nürnberg, because he would not agree to the Augsburg Interim; but was immediately afterwards invited by Albrecht, Duke of Prussia, to become the head of the theological faculty in the newly-established university of Königsberg. He was hardly settled here when he became entangled in a theological strife that imbibed his naturally imperious and arrogant temper. In a treatise, *De Lege et Evangelio* ('On the Law and the Gospel'), O. asserted that the righteousness by which sinners are justified, is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, as the impartation of a real righteousness, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q. v.). A seemingly amicable arrangement between the disputants was brought about by Duke Albrecht in 1551; but the strife was soon recommenced, by O. publishing some new writings in which he attacked Melancthon; nor did his death in the following year put a stop to the war of words. It was continued by his followers, called *Osiandristæ*, who were finally extinguished by the *Corpus Doctrinæ Prutenicæ* (in 1567), which caused their banishment from all parts of Prussia. See Wilken, *Andr. Osiander's Leben, Lehre und Schriften* (Strals. 1844).

O'SIER (Fr. probably of Celtic origin), the popular name of those species of Willow (q. v.), which are chiefly used for basket-making and other wicker-work. They are of low bushy growth, few of them ever becoming trees, their branches long and slender; and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. Their leaves are long and narrow, lanceolate, or nearly so, obscurely notched on the margin, almost always smooth on the upper side, but generally white and downy beneath. The

tree, which was cut down by the king, and the trunk, containing the chest and the body of the god, converted into a pillar to support the roof of the palace. The goddess proceeded to Byblos, and ingratiated herself with the queen's women by plaiting their hair and imparting to it an ambrosial smell, so that the monarch, whose name was Melcarthus, and his wife, Saosis or Nemanoun, invited her to court to take care of the royal child. She endeavoured to confer immortality upon him by placing him on a fire, and changing herself into a swallow, flew round the pillar and bemoaned her fate. The queen became alarmed at the danger of her child; Isis revealed herself, and asked for the pillar of tamarisk wood, which was given her. She then cut it open, and took out the chest, making great lamentations, and subsequently sailed for Egypt, with the eldest of the king's sons. The goddess, intending to visit Horus her son at Buto, deposited the chest in an unfrequented spot; but Typhon discovered it by the light of the moon, tore it into 14 pieces, and distributed each to a nome or district. Isis recovered all by passing the marshes in a boat of papyrus; all except the phallus, which had been eaten by the Lepidotus, the Phagrus, and Oxyrhynchus fish. Subsequently, a battle took place between Horus and Typhon or Set, which lasted three days, and ended by Typhon having fetters placed upon him. Isis, however, liberated Typhon, which so enraged Horus that he tore off her diadem, but Teti or Thoth placed on her the head of a cow instead. Typhon finally accused Horus of illegitimacy; but the question was decided between them by Teti or Thoth and the gods. From O., after his death, and Isis sprung Harpocrates. See HARPOCRATES. O. seems to have been finally revived, and to have become the judge of the Karneter or Hades, presiding at the final judgment of souls in the Hall of the two Truths, with the 42 demons who presided over the capital sins, and awarding to the soul its final destiny. Thoth or Hermes recorded the judgment, and justified the deceased against his accusers, as he had formerly done for Osiris.

Considerable diversity of opinion existed amongst the ancients themselves as to the meaning of the myth of Osiris. He represented, according to Plutarch, the inundation of the Nile; Isis, the irrigated land; Horus, the vapours; Buto, the marshes; Nephthys, the edge of the desert; Anubis, the barren soil; Typhon, was the sea; the conspirators, the drought; the chest, the river's banks. The Tanaitic branch was the one which overflowed unprofitably; the 28 years, the number of cubits which the Nile rose at Elephantine; Harpocrates, the first shootings of the corn. Such are the naturalistic interpretations of Plutarch; but there appears in it the dualistic principle of good and evil, represented by O. and Set or Typhon, or again paralleled by the contest of Ra or the Sun, and Apophis or Darkness. The difficulty of interpretation increased from the form of O. having become blended or identified with that of other deities, especially Ptah-Socharia, the pigmy of Memphis, and the bull Hapis or Apis, the avatar of Ptah. Osiris was the head of a tetrad of deities, whose local worship was at Abydos, but who were the last repetition of the gods of the other nomes of Egypt, and who had assumed an heroic or mortal type. In form, O. is always represented swathed or mummied in allusion to his embalmment; a net-work, suggestive of the net by which his remains were fished out of the Nile, covers this dress; on his head he wears the cap *atf*, having at each side the feather of truth, of which he was the lord. This is placed on the

horns of a goat. His hands hold the crook and whip, to indicate his governing and directing power; and his feet are based on the cubit of truth; a panther's skin on a pole is often placed before him, and festoons of grapes hang over his shrine, connecting him with Dionysos. As 'the good being,' or Onnophris the meek hearted, the celestial or king of heaven, he wears the white or upper crown. Another and rarer type of him represents him as the *Tot*, or emblem of stability, wearing the crown of the two Truths upon his head. His worship, at a later time, was extended over Asia Minor, Greece, and Rome, and at an early age had penetrated into Phœnicia, traces of it being found on the coins of Malta and other places. He became introduced along with the Isiac worship into Rome, and had votaries under the Roman empire. But the attacks of the philosophers, and the rise of Christianity, overthrew these exotic deities, who were never popular with the more cultivated portion of the Roman world.

Herodotus, ii. 40—42; Plutarch, *De Iside*; Tibullus, i. 7; Diodorus, i. 25; Prichard, *Mythology*, p. 208; Wilkinson, *Man. and Cust.* iv. 314; Bunsen, *Egypt's Place*, i. 414.

O'SMAZOME, a name given by Thenard to the spirit-extract of flesh, on which, as he supposed, its agreeable taste, when cooked, depended. The term is now abandoned by chemists.

O'SMIUM (symp. Os; equiv. 100; spec. grav. 10) is one of the noble metals which occurs in association with platinum in the form of an alloy with iridium. It may be obtained in the metallic condition by several processes which yield it either in thin, dark-gray glistening scales, or as a dense iron-black mass. It is the least fusible of all the metals; the oxyhydrogen jet volatilising, but not fusing it.

Five oxides of O. are known—viz., the *protoxide* (OsO), which is of a dark-green colour, and forms green salts when dissolved in acids; the *sesquioxide* (Os₂O₃), which has not been isolated; the *binoxide* (OsO₂), which is black; the *teroxide* (OsO₃), which possesses the characters of a weak acid, but has not been isolated; and *osmic acid* (OsO₄), which occurs in colourless, glistening, acicular crystals, freely soluble in water, and very volatile. At about 220°, this compound gives off an extremely irritating and irrespirable vapour; and hence the name of the metal (from the Greek word *osmô*, odour). It produces a permanent black stain upon the skin, and gives a blue precipitate with tincture of galls. O. also forms four chlorides, which correspond in composition to the first four oxides. This metal was discovered by Tennant in 1803.

O'SMOSE; DIALYSIS. The earlier discoveries of Dutrochet and Graham have been briefly described in the article on DIFFUSION (q. v.). The subject has, however, been much extended recently, principally by the investigations of Graham; and as the whole phenomena are exceedingly interesting and important, since secretion, absorption, and various other organic processes are to a great extent dependent on them, some further detail, especially of these later facts, may here be given.

When two different liquids are separated by a bladder or other membrane, or a piece of calico coated with coagulated albumen, there is always a more or less rapid transference of the two liquids in opposite directions through the diaphragm. In certain cases, the explanation given in the article referred to is complete, but in others it appears to be insufficient. Graham has made an extensive series of experiments upon osmose, where distilled

O'SPREY (*Pandion*), a genus of *Falconidae*, of which only one species is known (*P. haliaetus*), also called the **FISHING HAWK** or **FISHING EAGLE**, and sometimes the **BALD BUZZARD**. It is singular among the *Falconidae* in preying exclusively on fish; and to this its whole structure and habits are adapted. Its whole length is about twenty-two inches: it is of a dark-brown colour, variegated with black, gray, and white. The under parts are white, except a light-brown band across the chest.

Osprey (Pandion haliaetus).

The bill is short, strong, rounded, and broad. The tail is rather long, the wings are very long, extending beyond the tail; the under surface of the toes remarkably rough, covered with small pointed scales, suited for the securing of slippery prey; the claws not grooved beneath, as in most of the *Falconidae*. The feathers are destitute of the supplementary plume, which is considerably developed in most of the *Falconidae*. The intestine differs from that of the other *Falconidae* in being very slender and of great length.

The O. is chiefly to be seen near the sea, lakes, and large rivers. No bird is more widely diffused; it is found in all quarters of the world; its geographical range including Europe, Asia, Africa, North and South America, and Australia, and both very warm and very cold climates. It is everywhere a bird of passage, retiring from high northern latitudes on the appearance of frost. It occurs on many parts of the British coasts, and is sometimes found in inland districts, but is nowhere abundant in Britain. In some places in Scotland, it still breeds year after year, on the highest summit of a ruined building, or the top of an old tree. It is very plentiful in some parts of North America; and its return in the beginning of spring is hailed with joy by fishermen, as indicative of the appearance of fish. The nest is a huge structure of rotten sticks, in the outer interstices of which smaller birds sometimes make their nests; for the O. never preys on birds, and is not dreaded by them. It is, indeed, of a pacific and timorous disposition, and readily abandons its prey to the White-headed Eagle (or Erne, q. v.). In the days of falconry, the O., being very docile, was sometimes trained and used for catching fish.

O'SSA, the ancient name of a mountain on the east side of Thessaly, near Pelion, and separated from Olympus by the vale of Tempe. It is now called Kissevo. The conical summit is covered

with snow during the greater part of the year. The ancients placed the seat of the Centaurs and Giants in the neighbourhood of Pelion and Ossa.

O'SSEIN. This term is applied by chemists to the substance in the tissue of the bones which yields gluten. It is obtained by the prolonged action of dilute hydrochloric acid on bone, which dissolves all the earthy matter. The material thus procured retains the form of the bone without its hardness, and must be repeatedly washed with water, and treated with alcohol and ether to remove traces of salts, fat, &c. It is insoluble in water, but is converted into gluten (one of the forms of gelatine) by the action of boiling water—a transformation which is much facilitated if a little acid be present. The ossein yielded by different kinds of animals requires different times for its conversion into gluten; and that of young animals changes more rapidly than that of adults of the same species. It appears to exist in the bones in a state of freedom—that is to say, not in combination with any of the salts of lime. Fremy's analyses shew that the amount of gluten is precisely the same as that of the ossein which yields it, and that the two substances are isomeric.

O'SSIAN, **POEMS OF**. Ossian, or Oisín (a word which is interpreted the 'little fawn'), a Celtic warrior-poet, is said to have lived in the 3d c., and to have been the son of Fingal or Finn MacCumhaill. The poems which are ascribed to him in manuscripts of any antiquity, are few and short, and of no remarkable merit. But in 1760—1763, a Highland schoolmaster, James Macpherson (q. v.), published two epics, *Fingal* and *Temora*, and several smaller pieces and fragments, which he affirmed to be translations into English prose of Gaelic poems written by O., and preserved by oral tradition in the Scottish Highlands. Their success was wonderful. They were received with admiration in almost every country of Europe, and were translated not only into French and Italian, but into Danish and Polish. But their authenticity was challenged almost as soon as they saw the light, and a long and angry controversy followed. That they were what they claimed to be, was maintained by Dr Blair, Lord Kames, the poet Gray, and Sir John Sinclair. That they were more or less the fabrication of Macpherson himself, was maintained by Dr Johnson, David Hume, Malcolm Laing, and John Pinkerton. While this controversy still raged, another sprang up scarcely less angry or protracted. Macpherson made O. a Scotch Highlander, but the Irish claimed him as an Irishman. Both controversies may be said to have now worn themselves out, leaving as their several result a conviction which can scarcely be better stated than in the words of Lord Neaves: 1. 'The poems published by Macpherson as the compositions of Ossian, whether in their English or their Gaelic form, are not genuine compositions as they stand, and are not entitled to any weight or authority in themselves, being partly fictitious, but partly at the same time, and to a considerable extent, copies or adaptations of Ossianic poetry current in the Highlands, and which also, for the most part, is well known in Ireland, and is preserved there in ancient manuscripts. 2. Upon fairly weighing the evidence, I feel bound to express my opinion that the Ossianic poems, so far as original, ought to be considered generally as Irish compositions relating to Irish personages, real or imaginary, and to Irish events, historical or legendary; but they indicate also a free communication between the two countries, and may be legitimately regarded by the Scottish Celts as a literature in which they have a direct interest; written in their ancient tongue, according

that vessel, and is more common in the lower extremities than the upper. The affection is usually partial, but occasionally it appears to be almost universal. Thus, Dr Adams has recorded a case, in the Dublin Hospital Reports, in which no pulsation could be felt in any part of the body, and even the heart offered no other sign of action than a slight undulating sound. Old age strongly predisposes to this diseased condition, and probably few very aged persons are altogether exempt from it. There is also reason to believe that gout and rheumatism favour these calcareous deposits. This condition of the arteries may give rise to aneurism, to gangrene of the extremities in aged persons, and to atrophy, and consequent feebleness of the brain and heart. (The coronary arteries, which supply the heart with the arterial blood necessary for its own nutrition, are very often, although not always, ossified in angina pectoris.) Moreover, this condition of the vessels very materially increases the risk from severe accidents and surgical operations.

OSTADÉ, ADRIAN VAN, a celebrated painter and engraver of the Dutch school, was born at Lübeck, in North Germany, in 1610. His teachers were Franz Hals and Rembrandt. He followed his art at Haarlem, till the French army of Louis XIV. threatened Holland, when he removed to Amsterdam, where he spent the remainder of his life. He died in 1685. Country dancing-grounds, farm-yards, stables, the interiors of rustic hovels and beer-shops, are the places which he loves to paint; and his persons are for the most part coarse peasant carls, drunken tobacco-smokers, or peasant women employed in country work. In everything he did there is a bright and vivid naturalness. Not equal to Teniers in originality and quiet humour, he surpasses him in the force and fineness of his execution, though he is not free from triviality and repetitions, and inaccuracies in drawing. He was a prolific painter, and his works are to be found in all the museums and collections of the Netherlands, Germany, France, and England. They have been well engraved by Vischer, Suyderoef, and himself.—**ISAAC VAN OSTADE**, brother of Adrian, also a painter, was born at Lübeck in 1612, and died at Amsterdam in 1671. He did not equal his brother whose style he laboured to imitate.

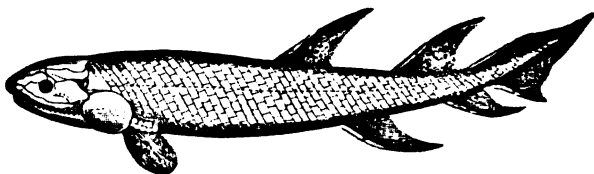
OSTASHKOFF, a manufacturing district town of Great Russia, in the government of Tver, stands on the south-east shore of Lake Seliger; lat. 57° 10' N., long. 33° 6' E. The first settlements on this site are said to have taken place in 1230. Pop. 10,827. Skin-dressing, boot-making, and fishing in the neighbouring lakes are the principal employments of the inhabitants. The woods in the vicinity furnish bark for tanning purposes, and charcoal for the blacksmiths' shops. There are in O. 37 tanyards, in which skins are dressed, and Russian leather prepared to the amount of £90,000 annually. The leather prepared at Savine's tanyard is known in England, Austria, Italy, and North America. 280,000 pairs of boots are made annually, and 400 men and 1000 women are engaged in the manufacture. Manufactures of hatchets and scythes are also carried on. The commerce of O. is small, however, owing to its remote distance from important lines of communication.

OSTENDE, a strongly fortified town of the Belgian province of West Flanders, on the German Ocean, at the opening of the Ostende and Bruges Canal, in 51° 14' N. lat., and 2° 55' E. long. Pop. 16,000. Notwithstanding its proximity to the sea,

the shallowness of the harbour prevents large ships from entering the port except at high tide. It ranks, however, as the second seaport of the kingdom, Antwerp being the first, and is fortified with walls and broad ditches. It has some good manufactories for linens, sailcloths, and tobacco, and several sugar, salt, and candle works. From its position as a station for the steamers plying daily between London, Dover, and the continent, and as the terminus of various branches of railway in connection with the great French and German lines, it is a lively and active place of transport traffic, and is resorted to in the summer as a bathing-place by persons from all parts of the continent. It is, moreover, an important station for oyster, cod, and herring fishing; has a good naval school, some ship-yards, an efficient staff of pilots, and is the seat of a commercial tribunal and a chamber of customs. The harbour is furnished with a light-house, and is provided with an admirably-constructed stone dyke or promenade for the accommodation of the public. O. is memorable for the protracted siege which it underwent from 1601 to 1604, and which terminated in the surrender of the Dutch and Flemish garrison to the Spanish commander, Spinola.

OSTEOCO'LA, a kind of size or glue made by removing the mineral matter from bones, and dissolving the gelatine. Its more common name is bone-glue.

OSTEOLEPIS (Gr. bone-scale), a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is



Osteolepis.

separated from its allies by having the two anal and two dorsal fins alternating with each other. Seven species have been described.

OSTEO'LOGY (Gr. *ostea*, the bones) is that department of anatomy which treats of the chemical and physical properties of the osseous tissue, and of the shape, development and growth, articulations, &c., of the various bones of which the skeleton is composed. See **BONE**, **OSSIFICATION**, **SKELETON**, &c.

O'STERODÉ, a small town of Hanover, in the principality of Grubenhagen, situated at the western base of the Harz Mountains, on the Söse, an affluent of the Leine, 20 miles north-east of Göttingen. It contains large grain stores, from which the miners of the neighbourhood and their families are supplied with grain at a low and fixed rate. Cotton, woollen, and linen fabrics and hosiery are extensively manufactured. Pop. 6000.

O'STIA, a city of Latium, at the mouth of the Tiber, about 16 miles from Rome. It is said to have been founded by Ancus Martius, and was regarded as the oldest Roman colony. It first acquired importance from its salt-works, the establishment of which is attributed to Ancus Martius, and afterwards as the port where the Sicilian, Sardinian, and African corn shipped for Rome was landed; yet its name first occurs during the second Punic war. It was long, too, the principal station of the Roman navy; but its harbour was exceedingly bad, and gradually the entrance became silted up with alluvial deposits, so that vessels could no longer approach

regarded. Contrary to a very generally received opinion, the O. does not leave her eggs to be hatched entirely by the heat of the sun; or, if this be the case in the warmest regions, it is otherwise in the more northern and southern countries in which this bird is found, and by a remarkable instinct, the O. sits upon the eggs by night, when the cold would be too great for them, and leaves them to the sun's heat during the day.

The O. feeds exclusively on vegetable substances, its food consisting in great part of grasses and their seeds; so that its visits are much dreaded by the cultivators of the soil in the vicinity of its haunts, a flock of ostriches soon making terrible devastation of a field of corn. The O. has a very large crop, a strong gizzard, and a pretty large *proventriculus* between the crop and the gizzard: the intestines are voluminous, and the *cæca* long, with a remarkable spiral valve. There is a receptacle in which the urine accumulates, as in a bladder, a thing very uncommon in birds.

The O. swallows large stones, as small birds swallow grains of sand, to aid the gizzard in the trituration of the food; and in confinement, has often been known to swallow very indiscriminately whatever came in the way, pieces of iron, bricks, glass, old shoes, copper coins, &c. Its instincts do not suffice to prevent it from swallowing very unsuitable things; copper coins were fatal in one instance, and a piece of a parasol in another.

The O. is very patient of thirst, or is capable of subsisting for a long time without water. It often supplies the want of water by eating the gourds or melons of the desert, to which even the lion is said to resort on the same account.

The speed of the O., when it first sets out, is supposed to be not less than 60 miles an hour; but it does not seem to be capable of keeping up this speed for a long time. It is successfully hunted by men on horseback, who take advantage of its habit of running in a curve; instead of a straight line, so that the hunter knows how to proceed in order to meet it and get within shot. It is often killed in South Africa by men who envelop themselves in ostrich skins, and admirably imitating the manners of the O., approach it near enough for their purpose, without exciting its alarm, and sometimes kill one after another with their poisoned arrows.

The strength of the O. is such that it can easily carry two men on its back.

The voice of the O. is deep and hollow, not easily distinguished, except by a practised ear, from the roar of the lion. It also more frequently makes a kind of cackling; and when enraged and striking violently at an adversary, hisses very loudly.

The flesh of the O. is not unpalatable when it is young, but rank and tough when old. It is generally believed to have been prohibited as unclean to the Jews (Lev. xi. 16), although the name is translated *owl* in the English Bible. There are frequent references to it in the Old Testament.

The eggs of the O. are much esteemed as an article of food by the rude natives of Africa, and are acceptable even to European travellers and colonists. Each egg weighs about three pounds, and is thus equal to about two dozen ordinary hen's eggs. The egg is usually dressed by being set upright on a fire, and stirred about with a forked stick, inserted through a hole in the upper end. The thick and strong shell is applied to many uses, but particularly is much employed by the South African tribes for water-vessels. The reader will probably recollect the interesting plate in Livingstone's *Travels* of women filling ostrich shells with water. In taking ostrich eggs from the nest, the South African is careful not to touch any with the

hand, but uses a long stick to draw them out, that the birds may not detect the smell of the intruder, in which case they would forsake the nest; whilst otherwise, they will return, and lay more eggs.

The long plumes of the O. have been highly valued for ornamental purposes from very early times, and continue to be a considerable article of commerce, for the sake of which the O. is pursued in its native wilds.

The O. is often to be seen in Britain in confinement, and readily becomes quite tame and familiar, although still apt to be violent towards strangers. Great numbers were exhibited in the public spectacles by some of the Roman emperors; and the brains of many ostriches were sometimes presented in a single dish, as at the table of Heliogabalus.

OSTRICH FEATHERS are occasionally borne as a heraldic charge, and always represented drooping. Three white ostrich feathers are the well-known badge of the Prince of Wales. According to common tradition, they were assumed in consequence of Edward the Black Prince having plucked a plume of ostrich feathers from the casque of John of Luxemburg, king of Bohemia, who fell by his hand at Crecy. There is, however, no doubt that ostrich feathers were previous to that time a cognizance of the Plantagenets. Prince Henry, eldest son of James I., first established the present arrangement of the three ostrich feathers within a prince's coronet.

OSTRO'G, a small district town of West Russia, in the government of Volhynia, 100 miles west of Jitomir. Here, in the reign of Constantine of Ostrog, a school and typography were established, and the first Slavonic Bible printed in 1558. Pop. 8926.

O'STROGOTHS. See **GOTHS**.

OSU'NA, a town of Spain in the province of Seville, and 48 miles east-south-east of the city of that name, stands in a fertile plain, and on a triangular hill crowned by a castle and the collegiate church. It stands in the midst of a highly fertile plain, productive in grain, olives, almonds, &c. An extensive panoramic view is obtained from the castle. The collegiate church, in the mixed Gothic and cinque-cento style, was built in 1534. It was pillaged by Sout of 5 cwt. of ancient church plate, and was converted by him into a citadel and magazine. Pop. 15,500, who are engaged in agriculture and in the manufacture of linen goods, and iron and earthenware.

OSWEGO, a city and port of entry, in New York, U.S., is situated at the mouth of Oswego River, on Lake Ontario, at the extremity of the Oswego Canal, a branch of the Erie, and also the terminus of the Syracuse and Oswego Railway. It is a handsome city, with streets 100 feet wide, crossing at right angles, with costly government buildings, custom-house, court-house, post-office, city hall, hospital, orphan asylum, library, 13 churches, 2 daily and 2 weekly newspapers, schools, &c. It has a large trade with the lake country and Canada, and exports 12,000,000 dollars per annum. On the falls of the river are 18 flour-mills, making 10,000 barrels of flour a day, with elevators for unloading vessels for 37,000 bushels an hour. Among the manufactures is that of 12,000,000 lbs. of starch from Indian corn per annum. This material, very commonly called Oswego Flour, or Oswego, is now largely used in cookery instead of arrow-root, to which it bears a close resemblance. There is a fort and navy-yard. Pop. in 1860, 16,817.

OSWEGO TEA, a name given to several species of *Monarda*, particularly *M. purpurea*, *M. didyma*,

of settlers reached the shores of O. in the spring of 1843. Capital, Dunedin (q. v.), with a pop. (in December 1861) of 6000, but which now (May 1864) must be vastly increased. O. was originally a class colony connected with the Free Church of Scotland; but the influx of immigrants consequent on the discovery of gold has obliterated its distinctive character.

OTAKEITE. See TAHITI.

OTALGIA (Gr. *ot*, the ear, and *algos*, pain) is neuralgia of the ear. It occurs in fits of excruciating pain, shooting over the head and face, but it is not accompanied by fever, nor usually by any sensation of throbbing. Its causes and treatment are those of neuralgia generally, but it is particularly caused by caries of the teeth, which should always be carefully examined by a dentist in these cases. When patients complain of *earache*, the pain is far more commonly due to *otitis*, or inflammation of the tympanic portion of the ear, a much more serious affection.

OTARY (*Otaria*), a genus of the Seal family (*Phocidae*), distinguished from the rest of the family by a projecting auricle or auditory conch (often popularly called 'external ear'), and by a very remarkable character, a double cutting edge in the four middle upper incisors. The membrane which unites the toes of the hind-feet is prolonged into a flap beyond each toe. The fore-legs, as if intended exclusively for swimming, are placed further back in the body than in the true seals, giving the otaries the appearance of having a longer neck. The hind-legs are more like the fore-legs than in the true seal. —The SEA LION (*O. jubata* or *O. Stelleri*) of the northern seas is about 15 feet in

three females. They feed on fish and the smaller seals. —The sea lion of the southern seas, once supposed to be the same, is now generally believed to be a distinct species, and, indeed, more than one species are supposed to inhabit the southern seas. —The URINE SEAL, URINE O., or SEA BEAR (*O. ursina*), is an inhabitant of the Northern Pacific. It is scarcely 8 feet long. The hinder limbs being better developed than in most of the seals, it can stand and walk almost like a land quadruped. The muzzle is prominent, the mouth small, the lips tumid, the whiskers long; the tip of the tongue is bifurcated, the eyes are large, the skin is thick, the hair long, erect, and thick, with a soft underclothing of wool. The food consists of sea otters, small seals, and fish. The urine seal is polygamous, a strong male appropriating to himself from eight to fifty females. It swims with great swiftness. It is fierce and courageous. Its skin is much prized for clothing in the regions in which it abounds. As in the case of the sea lion, it is doubtful if the geographical range of the sea bear extends to the southern seas, or if it is represented there by a similar species. Several other species of *O.* are inhabitants of the Pacific and Southern Oceans. The FUR SEAL (*O. Falklandica*) is one of these. It is found on the Falkland Islands, South Shetland, &c. It is of a long and slender form, with broad head, and clothed with soft, compact, grayish-brown hair, amongst which is a very soft, brownish fur. It is gregarious and polygamous. When South Shetland was first visited, its seals had no apprehension of danger, and unsuspectingly remained whilst their fellows were slain and skinned; but they have since learned to be upon their guard. The skin of the fur seal is in great demand, chiefly for ladies' mantles, and was much used for making a kind of soft fur cap, which was very common thirty or forty years ago.

OTCHAKOW, a small town and seaport of South Russia, in the government of Kherson, surrounded on all sides by a barren steppe, stands at the western extremity, and on the north shore, of the estuary of the Dnieper, 40 miles east-north-east of Odessa. It traces its foundation to the very earliest times, and is supposed by some to be the spot where stood the Grecian colony Olbia; by others, to be Tomi, the scene of Ovid's banishment. At the end of the 15th c., the khan of the Crimea built here a strong fortress. Its present name occurs, for the first time, in 1557. During the Russian wars with Turkey in the 18th c., O. was alternately the property of each, until it was taken by Potemkin in 1788, and definitively annexed to the Russian dominions. The vicinity of Odessa is fatal to the development of foreign commerce at its port. Pop. 5426, the greater part of whom are Jews, and are employed in salting fish for transport to Little Russia.

OTHMAN IBN AFFAN, third calif of the Moslems, was born about 574. He belonged to the family of the prophet, and was cousin-german of Abu Sofian. One of the early converts to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law and private secretary. He was elected to succeed Omar in the califate in December 644, and a most unworthy successor he proved to be. The Moslem empire, however, continued to extend itself on all sides till the insane nepotism of O. gave its progress a sudden check. The able and energetic leaders who had been appointed by Omar were superseded by members of his own family, and of that of Abu Sofian; and the consequences were what might have been

Sea Lion (*Otaria jubata*).

length, and weighs about 16 cwt. It inhabits the eastern shores of Kamtschatka, the Kurile Islands, &c., and is in some places extremely abundant. It is partially migratory, removing from its most northern quarters on the approach of winter. It is to be found chiefly on rocky coasts and inlet rocks, on the ledges of which it climbs, and its roaring is sometimes useful in warning sailors of danger. It is much addicted to roaring, which, as much as the mane of the old males, has obtained for it the name of sea lion. The head of this animal is large; the eyes very large; the eyebrows bushy; the hide thick; the hair coarse, and reddish; a heavy mass of stiff, curly, crisp hair on the neck and shoulders. The old males have a fierce aspect, yet they flee in great precipitation from man; but if driven to extremities, they fight furiously. Sea lions are capable of being tamed, and become very familiar with man. They are polygamous, but a male generally appropriates to himself only two or

expected. Egypt revolted, and the calif was compelled to reinstate Amru in the government of that country, and several other rebellions were only quelled by a similar restoration of the previous governors. Zealous Moslems deeply deplored the folly of their chief, and were indignant at seeing the chair of the prophet occupied by O., while Abu-bekr, and even Omar, were accustomed to seat themselves two steps below it. Emboldened by the knowledge of his vacillating and cowardly disposition, they showered upon him reproaches and menaces; but the bearer of their remonstrances having been bastinadoed by O.'s order, a general revolt ensued. O. averted the crisis by unconditional submission; but having soon after attempted to put to death Mohammed, the son of the Calif Abu-bekr, the latter made his appearance at Medina at the head of a troop of malcontents, and forcing his way to the presence of O., stabbed him to the heart. O. was of a mild and pacific disposition, but he was at the same time most ambitious of power, though after his accession to supreme authority, he shewed himself to be, either from age or natural imbecility, deplorably deficient in those energetic virtues, without which the control of a warlike people and the management of a mighty empire such as that of the Moslems, were utterly impossible. O. was the first to cause an authentic copy of the Koran to be composed.

OTHMAN, OTHOMAN, or OSMAN I., surnamed *Al-ghazi* ('the conqueror'), the founder of the Turkish power, was born in Bithynia in 1259. His father, Orthogrul, the chief of a small tribe of Oguzian Turks, had entered the service of Alla-ed-din Kaikobad, the Seljuk sultan of Iconium, and had rendered important services to that monarch and his successors in their wars with the Byzantines and Mongols. Orthogrul dying in 1289, after a rule of more than half a century, his tribe chose his son Osman (i.e., the 'young bastard') as his successor. O. trod in his father's footsteps; and on the destruction of the sultanate of Iconium in 1299 by the Mongols, succeeded in obtaining possession of a portion of Bithynia. He had previously subjugated many of the neighbouring Oguzian chiefs, and this new accession of territory rendered him powerful enough to attack the Byzantines with success. In July 1299, he forced the passes of Olympus, and took possession of the whole territory of Nicæa, with the sole exception of the town of that name, which resisted his efforts for five years longer. In 1301, he defeated the Emperor Andronicus II. at Baphæon; in 1307, he incorporated the province of Marmara in his dominions; and continued till his death, in 1326, steadily to pursue his plans of conquest. 'Othman,' says Knolles, 'was wise, politic, valiant, and fortunate, but full of dissimulation, and ambitious above measure; not rash in his attempts, and yet very resolute; to all men he was bountiful and liberal, especially to his men of war and to the poor. Of a poor lordship, he left a great kingdom (Phrygia, Bithynia, and the neighbouring districts), having added a great part of Asia Minor, and is worthily accounted the first founder of the Turks' great kingdom and empire.' O. assumed the title of sultan (though this is denied by many historians) on the extinction of the Iconium sultanate in 1299, held his court at Kara-Hissar, and struck money in his own name. From him are derived the terms *Ottomans*, *Othomans*, and *Osmanli* or *Osmanni*, which are employed as synonymous with *Turks*. See **OTTOMAN EMPIRE**.

OTHO, MARCUS SALVIUS, Roman emperor, was descended of an ancient Etruscan family, and was born 32 A.D. He was a favourite companion of

Nero, who appointed him governor of Lusitania, in which office he acquitted himself creditably. On the revolt of Galba against Nero, O. joined himself to the former; but being disappointed in his hope of being proclaimed Galba's successor, he marched at the head of a small band of soldiers to the forum, where he was proclaimed emperor, and Galba was slain, 69 A.D. O. was recognised as emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius. The first few weeks of his reign were marked by an indulgence towards his personal enemies, and a devotion to business, which, though at total variance with his usual habits, excited in the minds of his subjects the most favourable hopes. But the tide of rebellion raised in Germany by Valens and Cæcina during the reign of Galba had by this time gathered strength, and these commanders having prevailed upon Vitellius, who had become a mere good-humoured glutton, to join his forces to theirs, the combined army poured into Italy. O. fortunately possessed several able generals, who repeatedly defeated the rebels; but the prudence of some among them in restraining the enthusiasm of their troops, who wished further to follow up their victories, was unfortunately considered as cowardice or treason, and produced dissensions in O.'s camp. This state of matters becoming known to the generals of Vitellius, encouraged them to unite their armies, and fall upon the forces of Otho. An obstinate engagement took place near the junction of the Adda and the Po, in which the army of O. was completely routed, and the relics of it went over on the following day to the side of the victor. O., though by no means reduced to extremity, resolved to make no further resistance; settled his affairs with the utmost deliberation; and then stabbed himself, on the 15th of April 69 A.D.

OTHO I., or the Great, son of the Emperor Henry I. of Germany, was born in 912, and after having been early recognised as his successor, was, on the death of his father in 936, formally crowned king of the Germans. His reign was one succession of eventful and generally triumphant wars, in the course of which he brought many turbulent tribes under subjection, acquired and maintained almost supreme power in Italy, where he imposed laws with equal success on the kings of Lombardy and the popes at Rome, consolidated the disjointed power of the German emperors, and established Christianity at many different points in the Scandinavian and Slavonic lands, which lay beyond the circuit of his own jurisdiction. His earliest achievement was a successful war against the Bohemian Duke Boleslas, whom he reduced to subjection, and forcibly converted to Christianity; next, the Dukes of Bavaria and Franconia were compelled to succumb to his power; the former paying the penalty of his opposition to O. by defeat and death in battle, and the latter by the confiscation of his territories, which, together with the other lapsed and recovered fiefs of the empire, were bestowed on near and devoted relatives of the conqueror. After subduing the Slavi of the Oder and Spree, for whose Christian regeneration he founded the bishoprics of Havelburg and Brandenburg, driving the Danes beyond the Eyder, compelling their defeated king to return to the Christian faith and do homage to himself; and after founding, at the suggestion of his mother's former chaplain, Adeldag, the bishoprics of Aarhus, Ribe, and Slesvig, which he decreed were for ever to be free from all burdens and imposts, he turned his attention to the affairs of Italy. Here he presented himself as the champion of the beautiful Adelheid, the widow of the murdered King Lothaire; and having defeated her importunate suitor, Berengar II. (q.v.),

married her, and assumed supreme power over the north of Italy in 951. The wars to which this measure gave rise, obliged O. frequently to cross the Alps; but at length, after a great victory gained over the Huns in 955, and the defeat and capture of Berengar, O. was acknowledged king of Italy by a diet held at Milan; and after being crowned with the iron crown of Lombardy, was, in 962, recognised by Pope John XII. as the successor of Charlemagne, and crowned Emperor of the West at Rome. O. lost no time in asserting his imperial prerogatives; and having called a council, effected the deposition of John, whose licentiousness had become a burden to Italy and a scandal to Christendom, and caused Leo VIII. to be elected in his place. Fresh wars were the result of this step. Popes and anti-popes distracted the peace of Rome; but through all these disorders, O. maintained the supremacy which he claimed as Emperor of the West, in regard to the election of popes and the temporal concerns of the Roman territories. His later years were disturbed by domestic differences; for his elder son, Ludolph, and his son-in-law, Konrad of Lorraine, having risen in rebellion against him, through jealousy of his younger son and intended successor, Otho, the empire was distracted by civil war. Although the war terminated in the defeat of the rebels, and the recognition of young Otho as king of the Germans, and his coronation at Rome, in 967, as joint-emperor with his father, O.'s favourite scheme of uniting the richly-dowered Greek princess, Theophania, with the young prince, met with such contempt from the Greek emperor, that his outraged pride soon again plunged him into war. His inroads into Apulia and Calabria, however, proved convincing arguments in favour of the marriage, and Theophania became the wife of young Otho, with Calabria and Apulia for her dowry. O. died at Minsleben, in Thuringia, in 973, and was buried at Magdeburg, leaving the character of a great and just ruler, who had extended the limits of the empire, and restored the prestige of the imperial power more nearly to the stand which it occupied under Charlemagne than any other emperor. He created the duchy of Carinthia, and the markgrafsdoms of East and North Saxony; appointed counts-palatine; founded cities and bishoprics; and did good service to the empire, in reorganising the shaken foundations of its power in Europe. See Vehse's *Leben Kaiser O.'s des Grossen* (Dresd. 1827).

OTHO II., surnamed *Rufus*, 'the Red,' son of Otho I., was born in 955, and succeeded his father in 973. For a time, O. was content to rule under the regency of his mother, the Empress Adelheid; but differences having arisen between them, through the headstrong and ambitious inclinations of the young monarch, his mother withdrew from all share in the administration, and left him to the exercise of his own will, which soon brought him into collision with the great vassals of the crown. Civil war broke out under the leadership of Henry II. of Bavaria, who formed a secret alliance against the young emperor with Harald, king of Denmark, and Miciaslav of Poland, and for a time fortune inclined to the side of the rebels; but O.'s astuteness circumvented their designs, and after defeating Henry, and depriving him of his duchy, he marched against the Danish king, who had been making successful incursions into Saxony. O.'s first attack on the Dannevirke having proved of no avail, he retired, vowing that he would return before another year, and force every Dane to forswear paganism. O. kept his promise, returning to the attack the following year, when, according to the old chroniclers, acting by the advice of his ally, Olaf Trygvessen of

Norway, he caused large quantities of trees, brushwood, and stubble to be piled up against the Dannevirke, and set on fire, and this drove away the defenders, and destroyed their fortifications. The defeated Harold was soon overpowered by the superior numbers of the Germans, and compelled to receive baptism, as the badge of his defeat. The next scene of war was Lorraine, which the French king, Lothaire, had seized as a former appanage of his crown; but here, after a partial defeat, O. succeeded in reasserting his power; and not content with this advantage, devastated Champagne, pursued and captured Lothaire, and advanced upon Paris, one of the suburbs of which he burned. Scarcely was this war ended, when the disturbed condition of Italy called O. across the Alps. His presence put a stop to the insurrection at Milan and Rome, where he re-established order; and having advanced into Lower Italy, he defeated the Saracens, drove back the Greeks, and having re-established his supremacy in Apulia and Calabria, which he claimed in right of his wife, Theophania, made himself master of Naples and Salerno, and finally of Tarentum, in 982. The Greek emperor, alarmed at the successful ambition of O., called the Saracens again into Italy, who gave him battle with overwhelming numbers. The result was the total defeat of the emperor, who only escaped from the hands of the victors by plunging with his horse into the sea, and swimming, at the risk of his life, to a ship. Unluckily, it was a Greek ship, and O. was virtually a prisoner; but as the vessel neared Rossano, a friendly port, he contrived to escape by a cunning stratagem. O. now hastened to Verona, where a diet was held, which was numerously attended by the princes of Germany and Italy, and at which his infant son, Otho, was recognised as his successor. This diet is chiefly memorable for the confirmation by O. of the franchises and privileges of the republic of Venice, and the enactment of many new laws, which were added to the celebrated Longobard code. O.'s death at Rome, at the close of the same year, 983, arrested the execution of the vast preparations against the Greeks and Saracens, which had been planned at the diet of Verona, and left the empire embroiled in wars and internal disturbances. See Giesebrecht's *Jahrbücher des Deutschen Reichs unter der Herrschaft, Kaiser O.'s II.* (Berl. 1840).

OTHO III., who was only three years old at his father's death, was at once crowned king of the Germans at Aix-la-Chapelle in 983, from which period till 996, when he received the imperial crown at Rome, the government was administered with extraordinary skill and discretion by three female relatives of the boy-king—viz., his mother, Theophania; his grandmother, Adelheid; and his aunt, Matilda, Abbess of Quedlingburg, who, in conjunction with the learned Willgis, Archbishop of Mainz, directed his education. The princes of the imperial family disputed the right of these royal ladies to the custody of the young king; and Henry of Bavaria, the nearest agnate, having seized the person of O., tried to usurp the supreme power; but opposed by the majority of the other princes of the empire, he was compelled to release him, in consideration of receiving back his forfeited duchy. O. early shewed that he had inherited the great qualities of his forefathers, and when scarcely fifteen years of age, at the head of his army, defeated the troops of the patrician Crescentius, the self-styled consul of Rome, and thus restored order in the Roman territories. In 996, he was crowned emperor by his relative, Gregory V.; and having settled the affairs of Italy, returned to Germany, where he defeated the Slaves, who had long carried on war against the empire;

the Warle 29 miles west-south-west of York. Its parish church, built in 1507, has a plain Norman arch over the north door. Extensive cattle and grain markets are held here. There is a worsted, a paper, and a flour mill in the town. Pop. (1864) 4973.

OTORRHEA signifies a purulent or mucopurulent discharge from the external ear. It may be due to various causes, of which the most frequent is catarrhal inflammation of the lining membrane of the meatus, and the next in frequency is Otitis (q. v.) in its various forms. If the discharge is very fetid, a weak solution of chloride of lime, or of Condy's Disinfectant Fluid, may be used, in place of the solution of sulphate of zinc recommended in article OTITIS; and in obstinate cases of catarrhal inflammation of the lining membrane, the discharge may often be checked by pencilling the whole interior of the meatus with a solution of five grains of nitrate of silver in an ounce of water.

OTRANTO, TERRA DI, the extreme south-eastern province of Italy, forming the heel of the Italian boot, is bounded on the north-west by the provinces of Bari and Basilicata, and surrounded on all other sides by the sea. Area, 3293 square miles; pop. (1862) 447,982. It occupies the ancient Iapygian or Messapian peninsula, and is 102 miles in length, and from 25 to 35 miles in breadth. Three parts of its surface are covered with hills, offsets from the Apennines of Basilicata. All the rivers are short, many of them being lost in the marshes of the interior; but abundant springs and heavy dews render the soil surprisingly fertile. Good pastures and dense forests occur. The climate is pleasant and healthy, except along the shores, both on the east and west coasts, and in the vicinity of the marshes, which in summer generate malaria. An abundance of the best wine, with corn and olive-oil, are produced; tobacco (the best grown in Italy), cotton, and figs, almonds, oranges, &c., are also produced. The capital is Lecce (q. v.).

OTRANTO (the ancient *Hydruntum*), a small town on the south-east coast of the province of the same name, 24 miles south-east of Lecce. During the latter period of the Roman empire, and all through the middle ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece—having in this respect supplanted the famous Brundisium of earlier times. In 1480, it was taken by the Turks, and at that time it was a flourishing city of 20,000 inhabitants; but it has long been in a decaying condition, principally on account of malaria. O. possesses a castle and a cathedral. Its harbour is unsafe. In clear weather, the coast of Albania is visible from Otranto. Pop. about 2000.

OTTAWA, one of the largest rivers of British North America, rises in lat. 48° 30' N., long. 76° W., in the watershed on the opposite side of which rise the St Maurice and Saguenay. After a course of above 600 miles, it falls into the St Lawrence by two mouths, which form the island of Montreal; and the entire region, drained by it and its tributaries, measures about 80,000 square miles (*Geol. Rep.* for 1845—1846, p. 13). During its course, it widens into numerous lakes of considerable size, and is fed by many important tributaries, such as the Mattawa, Mississippi, Madawasca, and Rideau on the right, the Gatineau and the Rivières du Moine and du Lièvre on the left side. These, with the O. itself, form the means of transit for perhaps the largest lumber-trade in the world, while the clearances of the lumberer have opened the country for several thriving agricultural settlements. The navigation has been greatly improved,

especially for timber, by the construction of dams and slides, to facilitate its passage over falls and rapids. The O. is already connected with Lake Ontario at Kingston by the Rideau Canal; and there is every prospect of its becoming, before many years, the great highway from the north-western states to the ocean by being connected with the Georgian Bay in Lake Huron through the French River, Lake Nipissing, and the Mattawa. This great engineering achievement, for which capital will undoubtedly be soon forthcoming, would place the western lake-ports by water 760 miles nearer to Liverpool by Montreal than by New York through the Erie Canal, and would save nearly a week in time, while it would lessen considerably insurance and freight charges.—The O. possesses one of the few literary associations of Canada. At St Ann's, a few miles above its mouth, the house is pointed out where Moore wrote the Canadian Boat-song—

'Soon as the woods on shore look dim,
We'll sing at St Ann's our parting hymn.

Ottawa's tide, this trembling moon
Shall see us adloat on thy waters soon.'

OTTAWA, the capital of the United Canada, is situated 87 miles above the confluence of the river Ottawa with the St Lawrence, 126 miles from Montreal, 95 from Kingston, and 450 from New York. Originally called Bytown, after Colonel By, who in 1827 was commissioned to construct the Rideau Canal, it was incorporated as a city, and received the name which it now bears in 1854. At the west end of the city, the Ottawa rushes over the magnificent cataract known as the Chaudière Falls; and at the north-east end there are other two cataracts, over which the Rideau tumbles into the Ottawa. The scenery around O. also is scarcely surpassed by any in Canada. The immense water-power at the city is made use of in several saw-mills, which give O. its principal trade, and issue almost incalculable quantities of sawn timber. A suspension-bridge hangs over the Chaudière Falls, connecting Upper and Lower Canada. The city is in communication by steamer on the Ottawa with Montreal; on the Rideau Canal with Lake Ontario at Kingston; and with the Grand Trunk Railway by a branch line from Prescott. As yet, there is nothing in the city remarkable for architecture; but the provincial Parliament Houses, which are approaching completion, will probably be the finest buildings on the American continent. The population, which is rapidly increasing, in 1861 reached 14,669. O. returns one member to the provincial parliament.

OTTER (*Lutra*), a genus of quadrupeds of the Weasel family (*Mustelidae*), differing widely from the rest of the family in their aquatic habits, and in a conformation adapted to these habits, and in some respects approaching to that of seals. The body, which is long and flexible, as in the other *Mustelidae*, is considerably flattened; the head is broad and flat; the eyes are small, and furnished with a *nictitating membrane*; the ears are very small; the legs are short and powerful; the feet, which have each five toes, are completely webbed; the claws are not retractile; the tail is stout and muscular at its base, long, tapering, and horizontally flattened; the dentition is very similar to that of weasels; six incisors and two canine teeth in each jaw, with five molars on each side in the upper, and five or six in the lower jaw; the teeth very strong, and the tubercles of the molars very pointed, an evident adaptation for seizing and holding slippery prey. The tongue is rough, but not so much so as in the weasels. The fur is very smooth, and consists of two kinds of hair—an inner fur very dense and soft,

fortresses on the coast. The Greeks, with the usual contempt of civilisation for barbarism, made light of these losses, saying that the Turks had only taken from them a 'hog's sty' and a 'pottle of wine,' in allusion to the magazines and cellars built by Justinian at Gallipoli; but, as the historian Knolles quaintly remarks, 'by taking of such hogsties and pottles of wine, the Turks had gone so far into Thracia, that Amurath, a few years later, placed his royal seat at Adrianople.' Sultan Orkhan, perceiving the advantage of possessing a force trained exclusively for war, organised the body of troops known as Janizaries (q. v.), and to these his successor added the Spahis (q. v.) and the Zania.—AMURATH I. (1359—1390), the successor of Orkhan, rapidly reduced the Byzantine empire within the limits of Constantinople and some neighbouring districts in Thrace and Bulgaria. A formidable confederacy of the Slavonian tribes of the Upper Danube was formed against him, and, supported by multitudes of warriors from Hungary and Italy, they advanced into Servia to give him battle; but their army, amounting, it is said, to 500,000 men, was defeated with dreadful slaughter at Kosova (1390); and though the sultan was assassinated on the eve of the battle, his son, BAJAZET I. (q. v.) (1390—1402), followed up this victory by ravaging Servia and Walachia. Moldavia was also overrun, and a second crusading army, under the king of Hungary, totally routed at Nicopolis (1396); but the defeat and capture of the sultan by Timur (q. v.), gave Constantinople a respite for half a century, by raising up numerous claimants for the Turkish throne; and it was not till 1413 that Bajazet's youngest son, MOHAMMED I. (1413—1422), established his claim to the sceptre. A war which broke out with the Venetian republic at this time produced the most disastrous consequences to the mercantile and maritime interests of the Turks, and internal disorders prevented any aggressions on their neighbours.—AMURATH II. (1422—1450), a prince of considerable ability, completed the conquest of the Greek empire by reducing Macedonia and Greece Proper; and finding that the Hungarians had concluded a secret treaty of offence and defence with the Turkish sultan of Caramania against him, he attacked the former, but was defeated by Hunyady (q. v.), and compelled to retreat. Disheartened at his ill success, he resigned the throne; but on receiving news of a formidable invasion by the army of the papal crusade, resumed the direction of affairs, and totally defeated the invaders, with whom were Hunyady (q. v.) and Scanderbeg (q. v.), at Varna (1444).—MOHAMMED II. (q. v.) (1450—1481), the sworn foe of Christianity, greatly enlarged the Turkish territories. It was he who stormed Constantinople in 1453, and destroyed the last relic of the empire of the Caesars.—His son, BAJAZET II. (1481—1512), extended his dominions to the present limits of the Turkish empire in Asia and Europe, including, however, also the country to the north of the Black Sea, as far east as the mouth of the Don, portions of Dalmatia, and Otranto in Italy. Bajazet was the first to feel the evil effects of the military organisation of Sultan Orkhan, but all his attempts to get rid of his formidable soldiery were unsuccessful. He attempted the invasion of Egypt, but was totally defeated by the Mameluke sultan at Arbela (1493).—His successors, SELIM I. (q. v.) (1512—1520), and SOLYMAN I. (q. v.), (1520—1566), raised the O. E. to the height of its power and splendour. During their reigns, no ship belonging to a nation hostile to the Turks dared then navigate the Mediterranean, so completely did their fleets command that sea.—SELIM II. (1566—1574), a pacific prince, put an

end to a war with Austria, which had been commenced in the previous reign, by a peace in which it was stipulated that the Emperor Maximilian II. should pay a tribute of 30,000 ducats annually for the possession of Hungary, and that each nation should retain its conquests. During his reign, occurred the first collision of the Turks with the Russians. It had occurred to Selim, that the connection of the Don and Volga by a canal would, by allowing the passage of ships from the Black Sea into the Caspian, be a valuable aid to both military and commercial enterprise, and accordingly he sent 5000 workmen to cut the canal, and an army of 80,000 men to aid and protect them. But, unluckily, the possession of Astrakhan formed part of the programme, and the attack of this town brought down on the Turks the vengeance of the Russians, a people till then unknown in Southern Europe, and the projected canal-scheme was nipped in the bud. The rest of this sultan's reign was occupied in petty wars with Venice, Spain, and his rebellious feudatory of Moldavia.—His son, AMURATH III. (1574—1595), such was then the prestige of the Turks, dictated to the Poles that they should choose as their king, Stephen Batory, Waivode of Transylvania; and received the first English embassy to Turkey in 1589, the object of the embassy being to conclude an alliance against Philip II. of Spain. To this the sultan agreed; but the destruction of the Spanish Armada soon after rendered his interference unnecessary. After an exhausting, though successful war with Persia, succeeded a long contest with Austria, in which the Turks at first obtained the most brilliant success, penetrating to within 40 miles of Vienna, but afterwards suffered such terrible reverses, that they were compelled to evacuate all Hungary and Transylvania (hitherto a feudatory), and were only saved from destruction by the Poles, who entered Moldavia, and drove out the Transylvanians and Hungarians, thus affording the Turks an opportunity of rallying, and even recovering some of their losses. The latter part of this war happened during the reign of MOHAMMED III. (1595—1604), and afforded unmistakable symptoms of the decline of Turkish prowess; and a rebellion of the Pasha of Caramania, in Asia, which was quelled not as a Mohammed II. or a Bajazet I. would have quelled it, but by yielding to the pasha's demands, afforded an equally convincing proof of the growing weakness of the central administration, and set an example to all ambitious subjects in future. During the reigns of ACHMET I. (1604—1617), MUSTAFA (1617—1617, 1622—1623), OTHMAN II. (1617—1622), and AMURATH IV. (1623—1640), Turkey was convulsed by internal dissensions, nevertheless, a successful war was waged with Austria for the possession of Hungary; but this success was more than counterbalanced in the East, where Shah Abbas the Great conquered Mesopotamia, Kurdistan, and Armenia; and in the north, where the Poles took possession of some of the frontier fortresses. While Amurath was recovering his lost provinces in the East, the Khan of the Crimea, countenanced by the Poles and Russians, threw off his allegiance. Mustafa, the grand vizier, a man of great ability and integrity, continued to direct the helm of government under IBRAHIM (1640—1649); took from the Poles their conquests; and in a war with the Venetians (1645), obtained Candia and almost all the Venetian strongholds in the Aegean Sea, though with the loss of some towns in Dalmatia.—MOHAMMED IV. (1648—1687) commenced his reign under the most unfavourable auspices; he was only seven years of age, and the whole power was vested in the Janizaries and their partisans, who

used it to accomplish their own ends; but luckily for Turkey, an individual of obscure birth, named Mohammed Köprili, supposed to be of French descent, was, when over seventy years of age, appointed vizier; and the extraordinary talents of this man proved to be the salvation of Turkey at this critical juncture. He was succeeded (1661) in office by his son, Achmet, who, to equal ability, added the fiery and thorough-going energy of manhood in its prime; and under his guidance the central administration recovered its control over even the most distant provinces; a formidable war with Germany, though unsuccessfully carried on (1663), was concluded by a peace advantageous to the Turks; Crete was wholly subdued, and Podolia wrested from the Poles, together with the strong fortress of Kaminiac; though, shortly afterwards, much of this last acquisition was reconquered by John Sobieski (q. v.). Achmet's successor as vizier was Kara Mustafa, a man of little ability, who, however, overran the Austrian territories at the head of a large army and laid siege to Vienna; but the siege was raised, and his army defeated, by a combined German and Polish army under the Duke Charles of Lorraine, and John Sobieski, king of Poland. The Austrians followed up this victory by repossessing themselves of Hungary, inflicting upon the Turks a bloody defeat at Mohacz (1687); but their extravagant demands prevented the sultan from concluding a treaty, and the fortunate appointment of a third Köprili as grand vizier by SOLIMAN II. (1687—1691), was the means of restoring glory and fortune to the Turkish arms.—The reigns of ACHMET II. (1691—1695), and MUSTAFA II. (1695—1702), were occupied with wars against Austria; but with the death of Köprili (1691) at Belkement in the moment of victory, fortune deserted the Turks, and the war was closed by the peace of Carlowitz (q. v.) (1699), which for ever put an end to Turkish domination in Hungary.—ACHMET III. (1702—1730) wisely avoided involving himself in the war of the Spanish Succession; but the intrigues of Charles XII. (q. v.) of Sweden, while residing at Bender, forced him into a war with Russia; a step which was immediately followed by an invasion of Moldavia by the Czar Peter, at the head of 80,000 men. The Czar, however, relying on the aid of the Voivode of Moldavia to supply him with provisions, found himself in a dangerous strait with the Pruth behind him, an entrenched army of 150,000 Turks in his front, and 40,000 irregular Tartar cavalry harassing his flanks; while the promised provisions had been seized by the Moldavians, who preferred to supply the Turks with them. From this dilemma, he was rescued by the genius of his queen, afterwards Catharine I., and the folly of the grand vizier, who allowed him to retire on extremely easy terms—terms which the Czar, who was no observer of treaties, did not attempt to fulfil. The recovery of the Morea from the Venetians, and the loss of Belgrade and parts of Servia and Walachia, which were, however, recovered during the subsequent reign of MAHMUD I. (1730—1754), and the commencement of a long war with Persia (see NADIR SHAH), were the other prominent occurrences of Achmet's reign. In 1738, the career of Russian aggression commenced with the seizing of Azof, Orakof, and other important fortresses; but a scheme for the partition of Turkey between Austria and Russia, was foiled by the continued series of disgraceful defeats inflicted upon the Austrian armies by the Turks; the Russians, on the other hand, were uniformly successful; but the Czarina, becoming very desirous of peace, resigned her conquests in Moldavia, and concluded a treaty at Belgrade. Among the benefits conferred by Sultan

MAHMUD on his subjects, not the least was the introduction of the art of printing, and the great encouragement otherwise given to literature and science.—His successor, OTTHMAN III. (1754—1757), soon gave place to MUSTAFA III. (1757—1774), under whom, or rather under whose vizier, Raghib Köprili, the ablest statesman, after Achmet, that the Turks ever possessed, the empire enjoyed profound tranquillity; but after his death, the Russians, in violation of the treaty of Belgrade, invaded Moldavia, and took Choczim (1769), their fleet, in the following year, destroying the Turkish navy off Chios. Bender next fell, and the country to the mouth of the Danube, whilst the provinces in Asia Minor were also attacked; and, to crown these misfortunes, Egypt revolted.—The war with Russia continued during the succeeding reign of ABDUL-HAMID (1774—1789); the fortresses on the Danube fell into the hands of Romanzof, Suwarof, and Kaminaki, the Russian generals; and the main army of the Turks was totally defeated at Shumla. The campaign was ended 10th July 1774, by the celebrated treaty of Kutschouk-Kainardji.* The ink with which this document was written was scarcely dried before its provisions were infringed by the Czarina, who, after carrying on intrigues with the Crim-Tartars, took possession of the Crimea and the whole country eastward to the Caspian, and compelled the sultan to agree, in 1784, to this arrangement. These successes were accompanied by proceedings extremely insulting to the Turks (such as the placing on the gates of Kherson the inscription, 'This is the way to Byzantium'), and calculated to provoke, in the highest degree, a proud people, already deeply injured by unprovoked aggressions, and the perfidious violation of solemn engagements. The sultan was compelled, by his indignant subjects, to take up arms in 1787; and this was followed, in 1788, by another foolish attempt on the part of Austria to arrange with Russia a partition of Turkey; but, as before, the Austrian forces were completely routed, and she was compelled to agree to a treaty at Sistow. The Russians, however, with their usual success, had overrun the northern provinces, taking all the principal fortresses, and captured or destroyed the Turkish fleet.—The accession of SELIM III. (q. v.) (1789—1807) was inaugurated by renewed vigour in the prosecution of the war; but the Austrians had again joined the Russians, and both armies poured down with desolating fury upon the devoted Turks. Belgrade surrendered to the Austrians, while the Russians took Bucharest, Bender, Akerman, and Ismail (see SUWAROF); but the critical aspect of affairs in Western Europe made it advisable for Russia to terminate the war, and a treaty of peace was accordingly signed at Jassy, 9th January 1792. By this treaty the provisions of that of Kainardji were confirmed; the Dniester was made the boundary-line, the cession of the Crimea and the Kuban was confirmed, and Turkey made to pay 12,000,000 piastres (£109,000) for the expenses of the war. Belgrade was restored to the sultan. Up to

* In this treaty, the third article stipulates for the entire independence of the Tartars of the Crimea, Kuban, &c., and neither Russia nor Turkey is to interfere in their domestic, political, civil, and internal affairs, under any pretext whatever. The 16th article restores Bessarabia, Moldavia, and Walachia, with the fortress of Bender, on certain conditions, some of which are, that the Christians are not to be obstructed in the free exercise of their religion; that, when occasion may require, the Russian minister at Constantinople may remonstrate in their favour; and the Porte promises to listen to such remonstrances with all the attention which is due to friendly and respected powers. The 23d article restores Georgia and Mingrelia to Turkey.

this period, the Turks had lagged far behind in the march of civilisation; but now, when tranquillity was established, numberless reforms were projected for the better administration of the empire. The people were, however, hardly prepared for so many changes, and the sultan's projects cost him his throne and life. The occupation of Egypt by the French brought on a war between them and the Turks, in which the latter, by the aid of the British, were successful in regaining their lost territories. In revenge for the defeat of his Egyptian expedition, Napoleon contrived to entrap the sultan into a war with Russia and Britain, which was confined to a struggle in Egypt, in which the British were worsted.—After the ephemeral reign of MUSTAFA III. (1807—1808), the able and energetic MAHMUD II. (q. v.) (1808—1839) ascended the throne; and though his dominions were curtailed by the loss of Greece, which established its independence, and of the country between the Dniester and the Pruth, which, by the treaty of Bucharest in 1812, was surrendered to Russia, the thorough reformation he effected in all departments of the administration checked the decline of the O. E., and produced a healthy reaction, which has been attended with the most favourable results. Egypt, during his reign, threw off the authority of the sultan (see MEHEMET ALI, IBRAHIM PASHA), and is now merely a nominal dependency.—His son, ABDUL-MEDJID (1839—1861), a mild and generous prince, continued the reforms commenced in the previous reign; but the Czar, thinking, from the losses of territory which the Turks had lately sustained, and regardless of the changes which the last thirty years had wrought, that the dissolution of the O. E. was at hand, constantly interfered with its internal administration; and by a strained interpretation of former treaties (none of which, it may be remarked, Russia herself had ever faithfully observed, although she stringently enforced their observance on the part of the Porte), tried to wring from the sultan some acknowledgment of a right of interference with the internal affairs of the country. It was an attempt of this sort to obtain the exclusive protectorate of the members of the Greek Church in Turkey, that brought on the 'Crimean War' of 1853—1855, in which, for the first time after a long lapse of years, the Turks were victorious over the Russians. (See OMAR PASHA and other articles.) By the peace of Paris, Turkey regained a portion of territory north of the Danube, between Moldavia and the Black Sea, and extending along the coast to within 23 miles of the mouth of the Dniester; and was, to some extent, emancipated from the subservience to Russia into which she had been forced by previous treaties.—In 1861, ABDUL-AZIZ succeeded to the throne, and gives promise of an energetic and liberal administration. In 1862, Montenegro was reduced to the condition of a dependent principality.

OTWAY, THOMAS, an English dramatist of the 17th c., was the son of a clergyman of the Church of England, and was born March 3, 1651, at Trotton, near Medhurst, Sussex. He was educated at Winchester and at Christchurch College, Oxford, but left the university without taking a degree, and proceeded to London in search of fortune in 1671. He appeared on the stage in Sir William Davenant's company as the king in Mrs Behn's *Forced Marriage*; but his failure was signal, and he forsook the profession. For some time afterwards, he led a gay and dissolute life, but subsequently applied himself to dramatic composition. In 1675, *Alcibiades*, his first tragedy, was printed; and in the following year he produced *Don Carlos*, a play which was extremely popular, and, according to Downes (*Roscinus Anglicanus*), 'got more money than any

preceding modern tragedy.' Its popularity was due, however, as much to the patronage of Lord Rochester as to its intrinsic merits. His first comedy, *Friendship in Fashion*, appeared in 1678, and, being sufficiently immoral to please the taste of the age, met with general appreciation. In 1677, O. having received a cornet's commission from the Earl of Plymouth, went with his regiment to Flanders. The regiment, however, was disbanded in 1678, and O. resuming his former occupation, produced the tragedy of *Caius Marius* in 1680; and in the same year *The Orphan*, a play which met with an extraordinary, and, in some respects, a deserved measure of success. In 1681, *The Soldier of Fortune*, and in the following year, the finest of all his plays, *Venice Preserved*, were produced. From this time till his death, the poet had much to endure from poverty and neglect. Debts accumulating upon him, he retired to an obscure public-house on Tower Hill, for the purpose of avoiding his creditors, and here, at the premature age of 34, he died, April 14, 1685. The immediate cause of his death was a fever incurred by a hurried and fatiguing journey to Dover in pursuit of the assassin of one of his intimate friends, who had been murdered in the street. Another account of his death is that, after a long fast, he was choked by eating a morsel of bread; but this account rests upon no sufficient authority.

Although O. achieved a brilliant reputation during his lifetime, although he is described by Dryden as possessing a power of moving the passions which he himself did not possess, and later by Sir Walter Scott, as being Shakspeare's equal, if not his superior, in depicting the power of affection; yet his plots are artificial, and his language is without fancy, melody, or polish. The best edition of O.'s works was published in 1813.

OUDE, or OUDH, a province of British India, separated on the north from Nepal by the lower ranges of the Himalaya, whence it gradually slopes to the Ganges, which forms its boundary on the south and south-west. Lat. 25° 34'—29° 6' N., long. 79° 45'—83° 11' E. Extreme length from north-west to south-east, 270 miles; breadth, 160; area, 27,890 square miles, or rather less than that of Scotland. Pop. (1859—1860) estimated at 8,071,000, or about 289 to the square mile. O. is one great plain, the slope of which from north-west to south-east indicates also the direction of the principal rivers. These are the Gumti, the Ghagra (Ghogra), and the Rapti, which swarm with alligators. The northern part, on the edge of the Himalaya, is not very well known. It forms a portion of the Terai, a vast unhealthy tract stretching along the borders of Nepal, and covered with impassable forests. The climate of O. is cool and pleasant from November to March; during the next four months it is hot and sultry, after which follows the long rainy season, but in general it is considered the healthiest along the whole valley of the Ganges. The soil is light, and except small nodules of chalk and oolite called *kankars*, there is hardly a loose stone to be seen. O. was formerly more copiously watered than it is now, the clearing of the jungles having greatly decreased the moisture of the land. The chief crops are wheat, barley, gram, masure, mustard, rice (of the finest quality), millet, maize, joar, bajra, various kinds of pulse and oil-seeds, sugar-cane, tobacco, indigo, hemp, and cotton. The manufacturing industry of O. is not important; soda, saltpetre, and salt are the only articles of which more is produced than is requisite for home-consumption. Gunpowder, and all kinds of military weapons, guns, swords, spears, shields, and bows of bamboo, or Lucknow steel, are, however, also made, besides some woollen goods,

at Austerlitz and Jena, and gained the battle of Ostrolinka (16th February 1807), for which he was rewarded with the title of Count, and a large sum of money. He greatly contributed to the success of the French at Friedland, and was presented by Napoleon to the Czar Alexander as the 'Bayard of the French army, the knight *sans peur et sans reproche*.' He sustained his now brilliant reputation in the second Austrian campaign of 1809, and on the 12th of July was created Marshal of France, and on 15th of August, Duke of Reggio. In 1810, he was charged with the occupation of Holland, and by his unswerving probity and attractive personal qualities, drew the esteem of all classes. He was engaged in the disastrous Russian campaign, and subsequently took part in the various battles of 1813 between the French and the Russians and Austrians. He was one of the last to abandon Napoleon, but he did so for ever, and spent the period known as the 'Hundred Days' on his own estates. At the second restoration he became a minister of state, commander-in-chief of the royal guard and of the national guard, and was created a peer of France, Grand Cross of St Louis, &c. In 1823, he commanded the first division of the army of Spain, and was for some time governor of Madrid. After the revolution of July 1830, O. retired to his estates, and only at rare intervals presented himself in the Chamber of Peers. He became Grand Chancellor of the Legion of Honour in May 1839, succeeded Marshal Moncey as governor of the Invalides in October 1842, and died at Paris 13th September 1847. A statue was erected in his honour at Bar, 29th September 1850.—His son, CHARLES NICOLAS-VICTOR OUDINOT, Duke of Reggio (born 3d November 1791), was a general in the French army. He first distinguished himself in Algeria, and in the Revolution of 1848—having previously distinguished himself as a deputy (1842—1846) by his admirable talent for dealing with questions affecting the comfort and discipline of the soldiery—he was chosen commander-in-chief of the army of the Alps. In April 1849, he was appointed general of the French expedition against Rome, and forced the city to surrender unconditionally on the 1st of July, in spite of the heroic resistance of the republican triumvirs—Garibaldi, Mazzini, and Saffi. He was, however, not a Napoleonist, and at the *coup d'état*, 2d December 1851, shared the fate of every eminent general who would not violate his oath to obey the constitution—i. e., he was arrested and imprisoned. After some days he was set at liberty, and has since lived in retirement. O. has written several books of military matters.

QUISTITI. See MARMOSSET.

OUNCE. The Latin *uncia* (derived by Varro from *unus*) was the name of the twelfth part of the *as* or *libra* (pound), and also was applied to the twelfth part of any magnitude, whether of length, surface, or capacity. Hence *inch*, the twelfth part of a foot. The modern ounce is a division of the pound-weight. See POUND.

OUNCE (*Felis Uncia*, or *Leopardus Uncia*), a large feline animal, nearly resembling the leopard, but having much rougher and longer hair, a longer and much more bushy tail; the general colour is also paler, the rosette-like spots are less sharply defined, and there is a black spot behind the ear. Little is known of the O.; it is described by Buffon, but naturalists were for some time generally inclined to regard it as identical with the leopard, and its name has been transferred in South America to the Jaguar. It is a native of Asia, and probably of mountainous districts.

OURARI. See CURARI.

OURATEPE. See URATEPE.

OU'RO PRETO, a city of Brazil, capital of the province of Minas Geraes, stands among barren mountains, at an elevation of 4000 feet above sea-level, and 200 miles north-north-west of Rio Janeiro. It contains the governor's residence and a college, and consists mainly of narrow and irregular streets. In the vicinity is one of the most valuable gold mines in the province, which has been worked by an English mining company for upwards of 20 years. A good trade in coffee, &c. is carried on with Rio Janeiro, but is retarded by the want of good roads. The journey from O. P. to the capital of the empire is performed by horses and mules only, and ordinarily requires 15 days. Pop. about 12,000.

OUSE, called also, for the sake of distinction, the **NORTHERN** or **YORKSHIRE OUSE**, a river of England, is formed by the union of the Swale and the Ure in the immediate vicinity of the village of Boroughbridge, and flows south-east past York, Selby, and Goole. About eight miles below the last town, it joins the Trent, and forms the estuary of the Humber. The length of its course from Boroughbridge is 60 miles, for the last 45 of which (from the city of York) it is navigable for large vessels. Its principal affluents are the Wharfe and the Aire from the west, and the Derwent from the north-east. The basin of the O., or the Vale of York, commences from the northern boundary of the county near the river Tees, from whose basin it is separated by a low ridge of hills, and extends southward, including almost the whole of the county. See **YORKSHIRE**.

OUSE, GREAT, a river of England, rises close to the town of Brackley, in the south of Northamptonshire, and flows north-east through the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, and falls into the Wash 2½ miles below King's Lynn. It is 160 miles in entire length, and is navigable for about 50 miles. It receives from the east and south the Ivel, Cam, Lark, and Little Ouse.

OUTCROP, a term applied in Geology to the edge of an inclined bed at the place where it rises to the surface. The line of the outcrop is called the strike, which is always at right angles to the dip.

OUTER HOUSE. See COURT OF SESSION.

OUTFIT ALLOWANCE, in the British Army, is a sum of £150 for the cavalry, and £100 for the infantry, granted to non-commissioned officers promoted to commissions, to enable them to meet the heavy charges for uniform and equipments. The larger sum is given in the cavalry, because the newly-commissioned officer has to purchase his charger.

OUTLAWRY, in English Law, means putting one out of the protection of the law, for contempt in wilfully avoiding execution of legal process. Formerly, in the common law courts, if the defender would not enter an appearance, certain proceedings were taken to outlaw him, so as to allow the action to go on without his appearance. These proceedings, however, are now abolished, and, in the majority of cases, it is immaterial as regards the action whether the defendant appear or not, provided he was properly served with the original writ of summons. After judgment, he may still be outlawed, as a preliminary to seizing and selling his property. In criminal proceedings, outlawry still exists as part of the ordinary practice to compel a person against whom a bill of indictment for felony or misdemeanour has been found, but who will not come forward to take his trial, and who has not been arrested. In such a case, process of outlawry against him is

OUZEL, or **OUSEL** (Old Fr. *oiseil*, bird), an old name of the black-bird, as is evident from the descriptive lines of Bottom's song in *Midsummer Night's Dream*:

'The ouzel cock, so black of hue,
With orange tawny bill.'

It is also applied to other birds, chiefly of the thrush family. Thus, one British thrush is called the Ring Ouzel. The Dipper (q. v.) is very generally known as the Water Ouzel; and the Rose-coloured Pastor is also called the Rose-coloured Ouzel.

OVAL, the name given to the figure presented by a longitudinal section of an egg through its centre. The oval has a general resemblance to the ellipse; unlike the latter, however, it is not symmetrical, but is thicker at one end than the other, and at the thin end, narrows almost to a point. The term 'oval' is also used indiscriminately with 'nodus,' 'loop,' to denote the figure formed by a curve which either returns upon itself, as the lemniscata, &c., or the loops of the cubical and semicubical parabolas and other curves. In scientific language, it is specially distinguished from the term 'elliptical,' with which, in common parlance, it is usually confounded.

OVAMPOS AND OVAMPOLAND. The Ovampos or Otjherero are a tribe, seemingly a connecting link between the Kaffir and Negro races, who inhabit the region north of Great Namaqualand, in South Africa, extending north to the Cuanene River, and south to the parallel of 23° S. lat. The Ovampo tribes are described by Andersson as of a very dark complexion, tall and robust, but remarkably ugly. He found them, however, honest, industrious, and hospitable. They are not entirely pastoral, but cultivate much corn. Living in the same country are the Cattle Damaras, with still more of the Negro type, a stout, athletic people, very dirty in their habits, and generally armed with the bow and arrow. They live in a state of constant warfare with the Ghondannup, or Hill Damaras, a nearly pure Negro race, on the one hand, and the Namaqua Hottentots, who live south of them, on the other.

Ovampoland is a more fertile region than Namaqualand, from which it is separated by a wide belt of densely-bushed country. It has but few rivers, and these not of a perennial nature. About 50 miles from the coast, the country rises to a tableland about 6000 feet above the sea-level, and then declines to the south and east into the deserts of the Kalihari, and the region of Lake Ngami. Many strong indications of copper-ore are found in various places. The principal rivers, or rather water-courses, are the Swakop, Kusip, and their branches, which enter the Atlantic a few miles north of Walvis Bay. The other rivers in the interior seem to lose themselves in the sands. The climate is healthy, except near the coast, where fever in some seasons prevails. It seldom rains in the coast region, which is a very desolate one, and almost devoid of water. Thunder-storms are very violent in the summer season. All the large mammalia are found, more or less plentiful, according as water may be found at the different drinking-places. Elephants, rhinoceroses, elands, and other large animals driven from the south by the march of civilisation, take refuge in the desert region lying east of Ovampoland, where sportsmen like Green and Andersson have been known to kill as many as twelve elephants in a day. The country was first described by Sir J. Alexander, who visited its south border. Mr Galton afterwards penetrated much further north; and Mr C. J. Andersson has since fully explored it nearly as far

north as the Cuanene. Large numbers of horned cattle are annually collected by traders from the Cape in these regions, and whales abound on the coast. The trade in ostrich-feathers and ivory is of increasing importance, and several trading-stations are established for the collection of native products. Some elementary works have been printed in the Otjherero dialect by the German missionaries; two appear in Sir G. Grey's catalogue.

O'VARIES are organs peculiar to the female, and are analogous to the testes in the male. They are two oblong flattened bodies (about an inch and a half in length, three-quarters of an inch in width, and nearly half an inch thick in the human subject), situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tube. On making sections of an ovary, numerous vesicles are seen. These are the ovisacs of the future ova or germs, and are termed the *Graafian vesicles*. Before impregnation, they vary in number from ten to twenty, and from the size of a pin's head to that of a pea; but microscopic examination reveals the presence of young vesicles in large numbers. At each monthly period, a ripe Graafian vesicle bursts, and the ovum contained in it makes its way by ciliary motion along the Fallopian tube to the uterus, where, if it is not impregnated, it is disintegrated and absorbed.

Solid tumours or cysts, containing hair and teeth, are developed in these organs, but their principal disease is that to which the name of *Ovarian Tumour* is applied. This tumour may be described as consisting of an enormous enlargement of one or more of the Graafian vesicles into a mass which may weigh 80 or 100 pounds, or even more; and it may be either simple (that is to say, composed of natural structures much hypertrophied) or cancerous. The walls of the cysts (or enlarged Graafian vesicles) may be thin and flexible, or thick and cartilaginous; and the fluid they contain may be clear and limpid, or thick and ropy, or grumous and opaque. The only disease with which it can be confounded is ordinary abdominal dropsy, or *Ascites*, and when its nature is clearly determined, three modes of treatment are open for adoption: these are (1) tapping, (2) various surgical and medical means of producing atrophy of the tumour, and (3) extirpation of the organ, or ovariectomy.

1. Tapping is the simplest mode of relieving the patient; but the cyst soon refills, and the operation must be often repeated. 'Cases are extant in one of which the patient lived to be tapped 66 times at intervals of about a month, and in another, 128 times at intervals of six weeks; but, taken as a general rule, it may be affirmed that few patients survive more than four years after the first tapping, a period passed in the greatest misery and suffering.'—Druet's *Surgeon's Vade-mecum*, p. 498.

2. Under this head are included both numerous operations for causing the tumour to waste, and its internal walls to adhere, and the internal administration of absorbent medicines, with the view of producing atrophy and absorption of the tumour. The injection of tincture of iodine into the previously emptied cyst, is sometimes followed with good results, as in the case of Hydrocele (q. v.).

3. Ovariectomy, or total extirpation of the morbid mass, is an operation regarding which there has of late years been much discussion. Its opponents urge (1) the difficulty of diagnosis; (2) the frequency of adhesion of the tumour to adjacent parts—a point which can often not be ascertained till the abdomen has been opened; and (3) the great mortality that follows it: while in favour of the operation it is urged (1) that the mortality is not greater than from

OVARY—OVER DARWEN.

some other surgical operations which are regarded as justifiable; (2) that no other plan of treatment can effect a radical cure; (3) that if the surgeon, in order to complete his diagnosis, first makes a small incision, to enable him to ascertain the existence of adhesions, and closes it again with suture, if he finds this to be the case, no great harm is likely to result; and (4) that considering the miserable lives these patients lead during a course of tapping, &c., it is the most merciful course to adopt in patients who are young and otherwise healthy. For a description of the mode of performing the operation, and of the cautions to be observed, we may refer to a series of papers on Ovariectomy by Mr Spencer Wells in *The Medical Times and Gazette* for 1858 and 1859.

OVARY, in Botany. See GERMEN.

OVA-TION. See TRIUMPH.

OVEN, FIELD OR BARRACK, is a necessary apparatus in military economy to preserve the health of troops, by enabling them, at a comparatively small expenditure of fuel, to cook many rations together. In the British army, little attention was paid to such subjects, until, in 1858, the inquiries of Mr Sidney Herbert (afterwards Lord Herbert) brought to light the excessive mortality among soldiers, which was partly—and, as the event has shewn, justly—attributed to the bad cookery of their food. Captain Grant has bestowed much attention to army cookery, and has invented ovens for barrack use and for the field. While great improvements on the system—or want of system—which preceded them, these ovens are still admitted to be far from perfect in their arrangements.

Fig. 1 shows his barrack-stove for baking and

chimney. One or more empty barrels can be

Fig. 2.—Field cooking-wagon.
(Drawing the Soup.)

attached for steaming potatoes, and the roasting of

Fig. 3.—Field-oven.

A, empty cask used as a potato-steamer; B, coffee-roaster;
C, detached boiler.

coffee is performed, though not altogether successfully, in another cylinder made to revolve over the chimney.

OVER DARWEN is a very flourishing town of Lancashire, situated amid moorland hills, 3½ miles south of Blackburn, and 19½ miles north-west of Manchester, with which towns it is connected by the Lancashire and Yorkshire Railway. It has risen into wealth principally by a trade with India in calicoes. At present there are about 200,000 spindles and 12,000 looms at work in it, and on the completion of the 'India Mill,' 100,000 additional spindles will be set to work. This mill, now (June 1864) three parts erected, will be in many respects the finest in the country. It is a first-class stone building in the Italian style, with engine-house, chimney, &c., highly ornamented, is 100 feet high, and covers an area of 31,000 square feet. (See illustration of chimney.) The town also contains 5 paper

Fig. 1.—Barrack-stove.

A, boiler over fire; B, oven; C, movable boilers for meat;
D, potato-steamer.

boiling; fig. 2, his boiler-wagon for the field, its functions being the manufacture of soup and boiling of potatoes in nests in it. For boiling meat, &c., in the field, he employs detached cylinders, which, when empty, he proposes to join and floor over for use as postcocks; when in use they are united cross-wise, as in fig. 3, one in the middle serving for a

manufactories, the most extensive paper-staining works in England, 2 calico printing establishments, as well as works for iron founding, bleaching, machine and reed making, &c. There is an abundance of coal and stone in the neighbourhood, and the mines and quarries find employment for a considerable number of the inhabitants. The places of worship are—3 churches, 3 Independent chapels, a Baptist and a Wesleyan Methodist chapel, a Roman Catholic chapel, and 3 other dissenting chapels. There is also a Mechanics' Institution, a market house, and public baths; and a large public hall is contemplated, to accommodate 2000 people. Pop. (1851), 7020; (1864), 15,300.

OVERBECK, FRIEDRICH, born at Lübeck, July 3, 1789, a distinguished painter, to whom is justly awarded a large share of the merit of the movement in the early part of this century, from which arose the modern German school of art. He commenced his studies as an artist at Vienna in 1806; but having adopted, and continued to persist in carrying out certain notions on art, and the mode of studying it, essentially different from those inculcated in the academy, he was expelled along with certain other students who entertained the same views, and in 1809 set out for Rome. Here he was soon afterwards joined by Cornelius and Schadow; and these three, animated with similar ideas, and mutually encouraging one another, laid the foundation of a school that now holds a high rank, and has in no small degree influenced the taste for art in Europe at the present time. A picture of the Madonna, which O. painted at Rome in 1811, brought him into marked notice. He was next employed along with Cornelius and others, by the Prussian consul, General Bartholdi, to execute certain frescoes illustrating the history of Joseph, the 'Selling of Joseph' and the 'Seven lean Years' being the subjects assigned to him. After completing these, he painted in fresco, in the villa of the Marchese Massimi, five large compositions from Tasso's *Jerusalem Delivered*. In 1814, along with some of his artistic brethren, he abjured Lutheranism, and embraced the Roman Catholic religion. O.'s chief work is a fresco at Assisi, 'The Miracle of Roses of St Francis.' His oil pictures are inferior to his frescoes, being dry and weak in colour. His great picture, 'The Influence of Religion on Art,' preserved in the Stadel Institute at Frankfurt, and well known from the engraving, is an admirable composition, and is indeed the most favourable specimen of his powers as a painter in oil colours. He has executed a great many drawings remarkable for high feeling, most of which have been engraved. One of his last undertakings, a series of designs from the Evangelists, delicately engraved in the line manner, is a work of high excellence. O. has adhered closely to those ideas of art which he started with—namely, entire devotion to the style of the Italian artists prior to the period of the renaissance, particularly Fra Angelico (b. 1387—d. 1455), and a strong impression that form or drawing in the style of Greek or classic art is inadmissible in works embodying religious subjects; although many of his compatriots—Cornelius, for instance—have modified, or perhaps enlarged these ideas, and study the works of Michael Angelo and those of Raffael's later style executed under the influence of classic art. O. resides in Rome, and has made it the place of his abode since the time he went there as a student.

OVERBURY, SIR THOMAS, an English author and courtier, whose mysterious death has given a peculiar interest to his history, was the son of Nicholas Overbury, a Gloucestershire squire, and was born at Compton Scorfen, Warwickshire, the

residence of his maternal grandfather in 1581. At the age of fourteen he entered Queen's College, Oxford, where he highly distinguished himself in logic and philosophy, and where he took the degree of B.A. in 1598. He then joined the Middle Temple, but soon after set out for the continent, from which he returned with the reputation of being a finished gentleman. While on a visit to Scotland in 1601, he met for the first time with his future murderer, Robert Carr (properly Ker), then a page in the service of the Earl of Dunbar. An intimacy unfortunately sprung up between the two, and Carr—a handsome ignoramus, sensual and unprincipled—followed his scholarly friend to London. On the accession of James to the English throne (1603), Carr rose rapidly into royal favour, and was created Viscount Rochester. Through his influence, O. was knighted in 1608, and his father appointed a judge for Wales. In return, O. gave his patron the benefit of his wit and judgment, both of which were singularly excellent; and, according to Hume, it was owing to O. that Carr enjoyed for a time the highest favour of the prince without being hated by the people. The circumstances that led to a rupture of their intimacy, and turned the earl into O.'s secret and relentless enemy, form one of the most flagrant scandals in the history of the English court. A brief outline of these circumstances is all that can be given here.

At the age of thirteen, Frances Howard, daughter of the Earl of Suffolk, was married (1606) to the Earl of Essex, himself only a year older. On account of their youth, it was reckoned advisable by their friends that they should not live together for some time. The boy-husband went away on his travels, and the wedded girl to her mother. After the lapse of nearly five years, Essex came home, and found his wife, now a splendid beauty of eighteen, the idol of all the court gallants. But there was not a touch of virtue or goodness in her whole soul. She had the disposition of a Messalina (q. v.) or a Brinvilliers (q. v.). For her husband she showed the greatest aversion, and only consented to live in his house at the command of the king. It was well known that she had had intrigues with more than one lover, but in particular to Rochester, for whom she now cherished a fierce passion. O. had been instrumental in bringing about their guilty intercourse, and was now to reap the reward due to a pander. Rochester having told him that he purposed to get Lady Essex divorced from her husband, and then to marry her, O. strongly deprecated the idea, and declared that it would be disgraceful to form a union with so depraved a creature—she might do for a mistress, but not for a wife! The earl told Lady Essex what O. had said of her; she became furious for revenge, and offered Sir David Wood (between whom and O. there was a standing quarrel) £1000 to assassinate him, which that canny Scot declined to do. Rochester himself was now persuaded by his mistress to join privately in a plot against O., who on a most trivial and illegal pretext was thrown into the Tower, April 21, 1613. It was some time before he could bring himself to believe that his friend and patron was the cause of his imprisonment; but when he had assured himself of Rochester's treachery, he threatened to divulge certain secrets in his possession, whereupon it was determined by the earl and his mistress that he should be poisoned. This, after several trials, was successfully accomplished, and O. expired on the 15th of September. Rochester (now created Earl of Somerset), and his paramour were married on the 26th of December with great pomp, the brazen-faced beauty wearing her hair 'as a virgin,' and the whole

affair was soon to appear forgotten; but after George Villiers had supplanted the earl in the royal favour, an inquiry was instituted; Somerset and his wife were tried and found guilty of poisoning, but were, by an amazing and infamous stretch of the royal prerogative, pardoned. The motive for James's extraordinary clemency has never been ascertained; but the prevailing opinion is, that it was to prevent the disclosure of some discreditable, if not criminal, incidents in the private life of that monarch.

O. wrote several works, all of which were posthumously published. The principal are, *The Wife* (1614), a didactic poem; *Characters* (1614), the wit, ingenuity, precision, and force of which have long been admitted; *Crumbs Fallen from King James's Table* (1715). The latest edition of O.'s works is that by E. F. Rimbault with Life (1856).

OVERLAND ROUTE to India, the route generally chosen by those to whom time is a more important consideration than expense. The management of the route is in the hands of the Peninsular and Oriental Steam Company, who present the traveller with a choice of lines of route to Alexandria in Egypt. He may sail from Southampton via Gibraltar and Malta, reaching Alexandria in 13 days, a very convenient route for those who have much luggage, as no shifting is required till Alexandria is reached; or he may travel overland by railway and steamer to either of the ports of Marseille or Trieste. The shortest route from London to the former is via Dover, Calais, and Paris, Alexandria being reached in 11 days (including the necessary stoppages at different points on the route); and to the latter, via Dover, Calais, Paris, Turin, and Venice. The total length of journey to Alexandria from London by this route is 14 days; but as there are only 5 days of sailing, it is for that reason frequently preferred.

From Alexandria, passengers are conveyed by rail to Suez, where they again embark on board the Peninsular and Oriental Company's steamers, and are conveyed to Bombay, Madras, Calcutta, &c. The time occupied in travelling from Alexandria to Bombay is 13 days, to Madras 24 days, and to Calcutta 29 days. Thus a traveller can reach Calcutta from London in 40 days; at an expense, however, of more than £100. The long sea-route round by the Cape of Good Hope cannot be accomplished by steamer in less than 94 days, and by sailing vessels it takes more than four months, but the cost is much less.

OVERSEERS are officers appointed annually in all the parishes in England and Wales, whose primary duty it is to rate the inhabitants to the poor-rate, collect the same, and apply it towards giving relief to the poor. These officers occupy an important position in all English parishes. They were first ordered to be appointed in each parish by the statute of 43 Eliz. c. 2, the leading Poor-law Act, which directed four, three, or two substantial householders in the parish to be nominated yearly, and a later statute fixed the time of nomination to be 25th March, or a fortnight thereafter. The courts have held that not more than four, nor less than two, can be appointed, the object being, probably, that so much responsibility should not be thrown on any one individual. Though it is usual for the vestry of the parish to nominate two persons to be overseers, still those who really appoint them are the justices of the peace, who are not bound to regard the wishes of the vestry in this respect. It is only householders in the parish who are qualified for the office, and though it is not necessary that they should actually reside in the parish, still they must occupy or rent a house there. Several classes

of persons are exempt from serving the office, such as peers, members of parliament, clergymen, dissenting ministers, barristers, attorneys, doctors, officers of the army and navy, &c. But all who are not specially exempted by some statute are liable to serve the office, and even women may be appointed, though they scarcely ever are so in practice. The office is compulsory, and entirely gratuitous; and so necessary is it that some one shall fill the office, that it is an indictable misdemeanour to refuse, without cause, to serve when duly appointed. Though overseers are the proper managers of the poor for each parish, yet some parishes, especially in large overgrown towns, have been regulated by local acts, and guardians of the poor provided; and other parishes are under what is called a select vestry. In such cases, the overseers, though still appointed, are only allowed to give relief to paupers in certain urgent and exceptional cases, the ordinary regulation of poor-law affairs being confined to the guardians or the select vestry. The primary duty of the overseers consists in making, collecting, and applying the poor-rate for the relief of the poor of the parish, but, as will be seen, advantage has been taken by the legislature of the existence of these officers always representing the parish, to throw upon them various miscellaneous duties which are not directly connected with poor-law affairs.

1. Of the duties connected with the management of the poor. The overseers along with the churchwardens are to make a rate once or twice a year; i.e., a list of all the occupiers of lands and houses in the parish, specifying their names and the property occupied by each, and the ratable value and amount due by each. The next thing to be done is to go before two justices of the peace, and get the rate allowed—i.e., signed by them—and then it is published on the church-door on the following Sunday. The overseers must collect the rate also; but in all large parishes there is a collector of poor-rates who is specially appointed and paid for the purpose of collecting it. If a party refuses to pay the rate, the overseers must take proceedings before justices to compel payment, which is done by distraining the goods of the party, or, if there are no sufficient goods, by getting a warrant to imprison him. The party may, however, appeal against the rate to the Court of Quarter Sessions. When the money is collected, the overseers have to apply it towards the relief of the poor, and many other purposes of a kindred nature. Relief must be given to all the poor in the parish who are in a destitute state; but it is the duty of the overseers, when the pauper has not a settlement in the parish, to obtain an order of removal, i.e., to get an order of justices, under which the pauper is taken by force, and sent to the parish where he has a settlement. See, REMOVAL OF THE POOR. Relief is given, in general, only in the workhouse, and according to certain rules and conditions. Where the parish is included in a poor-law union, as is now generally the case, then the duty of overseers in giving relief is entirely confined to certain urgent cases; for the guardians of the union administer the ordinary business of the workhouse, and of relief generally. Another duty incident to overseers of a parish in a union is the duty of making out valuation lists—i.e., a new valuation of the property in the parish—which list is ordered by the guardians with a view to produce some uniformity in assessing the burdens on the various occupiers. Formerly, the mode of valuing property for the purposes of the poor-rate was not subject to any uniform rule, and in some parishes the valuers made a larger deduction from the actual value than in others; but in 1862, a statute passed, called the Union Assessment Act,

the object of which was to enable new valuations to be made on a uniform plan, till the occupiers in all the parishes are treated alike. At the end of the year of office, the accounts of the overseers of parishes in unions are audited by a poor-law auditor, who is a paid officer, and who examines the vouchers, and sees that no illegal payments have been made.

2. The miscellaneous duties now imposed by statute on overseers, over and above their original duty of relieving the poor, are numerous. The most prominent, perhaps, is that of making out the list of voters for members of parliament. This duty is done in obedience to certain precepts issued by the clerk of the peace each year, who gives the overseers full instructions how to make out the lists, and what claims and objections to receive, and how to deal with them. The overseers must also attend the court of the revising barrister, when he revises the lists, and disposes of legal objections. Another duty of the overseers is to make out the list of persons in the parish qualified to serve as jurors. So they must make out the burgess lists when the parish is situated within a borough. They must also make out the list of persons qualified to serve as parish constables. They are also bound to appoint persons to enforce the Vaccination Acts; they must give notice to justices of all lunatics within the parish, and pauper lunatics are removed to the county asylum, or in some cases, if it is safe in the opinion of the medical officer, may be kept in the workhouse. The overseers must also perform certain duties as to the election of guardians for the union. They must also bury the dead bodies of persons cast on shore, and of all paupers who die in the parish. They also are the proper parties to protect village greens from nuisances; and in general, where there is no local Board of Health, the overseers are the parties bound to act in carrying out the Nuisances Removal Acts (see NUISANCE) within the parish, which of itself is an onerous duty. In general, whenever overseers are bound to do miscellaneous duties of this kind, they are authorised to pay the necessary expenses and disbursements out of the poor-rate; but, as already stated, their services are gratuitous. The duties which in England are performed by overseers, devolve, in Scotland, upon the parochial board, the sheriff-clerk of the county, session-clerk, and others.

OVERSEER, ASSISTANT. An assistant overseer is a paid officer, whose services have generally been found necessary in the larger parishes, in order to relieve the annual overseers of their burdensome office to some extent. Accordingly, the ratepayers, in vestry assembled, appoint a person as assistant overseer with a salary, who performs most of the same duties as the overseers. In many cases, however, a collector of poor-rates has been appointed, who is also paid by salary, and in such a case he discharges like duties. Both the assistant overseer and the collector of poor-rates are bound to find security for the faithful discharge of their duties, and for duly accounting for moneys in their hands.

OVERSTONE, SAMUEL JONES LOYD, LORD, one of the most skilful political economists, and the ablest writer on banking and financial subjects that this country has produced. He was born in 1796, being the only son of Mr Lewis Loyd, descended from a respectable Welsh family, and a leading partner in the eminent banking house of Jones, Loyd, and Co. of London and Manchester. Having gone through a regular course of instruction at Eton, young Loyd was sent to Trinity College, Cambridge, where he had Dr Blomfield, late Bishop of London, for tutor, and where he acquired a very

extensive acquaintance with classical literature, and with the history and literature of his own country and of Europe generally. On leaving Cambridge, Loyd entered the banking-house as a partner along with his father, and on the retirement of the latter, he became its head. He distinguished himself highly in his capacity of banker. He had a profound knowledge of the principles of banking, and these he applied on all occasions in conducting the business in which he was engaged. Far-sighted and sagacious, he was seldom deceived by appearances or pretensions, however specious. Perhaps, if anything, he was too cautious; but he was neither timid nor irresolute. He was eminently successful in the employment of the very large deposits at his command, and while he eschewed hazardous transactions, he did not shrink from engaging in very extensive operations when he believed they could be undertaken with a due regard to that safety which should always be the first consideration in the estimation of a banker.

Loyd entered parliament in 1819 as member for Hythe, which he continued to represent till 1826. He made several good speeches in the House; and was one of a small minority that voted for the proposal to make bankers issuing notes give security for their payment. Though opposed to all changes of a dangerous or revolutionary character, Loyd has been always a consistent liberal. Having either withdrawn, or being on the eve of withdrawing from business, Loyd was raised to the peerage in 1850, by the title of Baron Overstone and Fotheringhay, county Northampton; and if great wealth, consummate intelligence in regard to matters of great public importance, and the highest degree of integrity and independence, be qualifications for a seat in the Lords, few peers have had a better title to be enrolled in that august assembly.

The first of Lord O.'s famous tracts on the management of the Bank of England and the state of the currency was published in 1837, and was followed by others between that period and 1857. The proposal for making a complete separation between the banking and issue departments of the Bank of England, introduced by Sir Robert Peel into the act of 1844, was first brought forward in these tracts, and its adoption has been the greatest improvement hitherto effected in our banking system. Having been collected, these tracts were published in 1857, with extracts from evidence given by Lord O. before committees of the Lords and Commons. And it would not be easy to exaggerate the value of this volume. Lord O. has also reprinted, at his own expense, four volumes of scarce and valuable tracts on metallic and paper money, commerce, the funding system, &c., which he has extensively distributed.

An inquiry took place before a committee of the House of Commons in 1857 into the practical working of the act of 1844, and Lord O. was the principal witness who came forward in defence of the act; but several leading members of the committee being hostile to it, exerted themselves to overthrow his lordship's theories and opinions, and subjected him to a severe cross-examination; which gave Lord O. the opportunity of successfully vindicating the principles and practical working of the act. This evidence was published in a separate volume in 1857.

Lord O. does not often speak in the House of Lords. His speech on the late commercial treaty with France is probably the best of his parliamentary appearances. He has also been a zealous opponent of the principle of limited liability. He was a leading member of the commission appointed to inquire into the proposal for the introduction of

OVERTURE—OVID.

a decimal system of arithmetic, and powerfully advocated the opinion that it would be injurious rather than beneficial.

All who have the privilege of knowing Lord O. regard him as one of the most honourable, high-minded, and upright men in the empire. But his rigid adherence to principle in his writings, his dealings, and his conversation, and his undisguised contempt for twaddle and pretension of all sorts, have made him be generally looked upon as austere and without sympathy. Such, however, is not the fact. When proper cases for the display of sympathetic and generous feelings are brought before him, none evince them more strongly. We may add that his conversational talents are of the highest order.

OVERTURE (from Fr. *ouverture*, opening), a musical composition for a full instrumental band, introductory to an opera, oratorio, cantata, or ballet. It originated in France, and received its settled form at the hands of Lulli. Being of the nature of a prologue, it ought to be in keeping with the piece which it ushers in, so as to prepare the audience for the sort of emotions which the author wishes to excite. Such is to a great extent the character of the beautiful overtures by Mozart to *Zauberflöte* and *Don Giovanni*, by Weber to *Freischütz*, and by Mendelssohn to his *Midsummer Night's Dream*, which are enriched by snatches of the more prominent airs in these operas. In the end of last century, overtures were written by Haydn, Pleyel, and other composers, as independent pieces to be played in the concert room; this sort of overture being, in fact, the early form of what was afterwards developed into the **SYMPHONY** (q. v.). The overture, as well as the symphony, is designated by the name *sinfonia* in Italian.

OVERYSSEL, a province of the Netherlands, is bounded on the N. by Friesland and Drenthe; E. by Hanover and Westphalia; S. and S.-W. by Gelderland; and W. by the Zuider Zee. It has an area of 1274 square miles; and (1863) a population of 241,333. The soil is sandy, with clay lands by the Yssel, rich pastures along the Zuider Zee and rivers, tracts of peat-land in various parts, and extensive heaths which are gradually being brought into cultivation. From south to north the province is intersected by an unbroken chain of sand-hills. The chief cities are Zwolle, Deventer, and Kampen; important manufacturing towns of less note being Almelo, Avereest, Dalsen, Haaksbergen, Hardenberg, Hellendorf, Lonneker, Luser, Raalte, Staphorst, Steenwykerswold, Tubbergen, Weerselo, Wierden, Zwollerkerpel, &c. The principal employments are—agriculture, manufactures of various kinds, fishing, making peat, shipping, and merchandise. In 1862, of 128,709½ acres under cultivation, 65,526 were in rye, 24,453 in potatoes, 18,367 in buckwheat, 7630½ in oats, 4460 in barley; wheat, colza, beans, flax, carrots, &c., occupying smaller breadths. The stock consisted of 16,582 horses, 117,067 horned cattle, 30,352 sheep, 22,318 swine, and 8265 goats.

At the five leading markets, Zwolle, Deventer, Kampen, Almelo, and Steenwyk, besides the ground produce, were sold 3,007,981½ lbs. of butter, of 17½ oz. avoirdupois per lb. In O., 331,114 acres are still waste lands, 261,926 are in pasture, and 7388½ in wood.

Carpets are manufactured at Deventer and Kampen, leather at Blokzyl, calicoes and other cotton fabrics at Kampen, Almelo, Dalsen, Ommen, and many other towns. There are extensive brick-works at Ryssen, Zwollerkerpel, Markeio, and Dapenvoort, producing (1862) a yearly aggregate

of 43,760,000. Ship-building is carried on at Zwarts-luis, Vollenhove, Steenwykerwold, Avereest, &c.

There are 74 Dutch Reformed clergymen, 98 Roman Catholic priests, and a few churches belonging to smaller Protestant sects. The attendance at school is about 1 to 9 of the population. In 1862, the births amounted to 7318, of which 206 were illegitimate, or about 1 to 35½; the deaths were 5673, or about 42 to the 1000 of the population.

The principal rivers are the Yssel, into which the Schipbeek runs, and the Overyselsche Vecht, which falls into the Black Water. Other important water-ways are the Dedems-Vaart and the Willems-Vaart canals. The island of Schokland, in the Zuider Zee, belongs to Overysel.

O'VID (**PUBLIUS OVIDIUS NASO**), the descendant of an old equestrian family, was born on the 20th March 43 B.C., at Sulmo, in the country of the Peligni. He was educated for the bar, and under his masters, Arellius Fuscus and Porcius Latro, he became highly proficient in the art of declamation. His genius, however, was essentially that of the poet, and the writing of verses began to absorb the time that should have been spent in the study of jurisprudence. His father, having but a scanty patrimony to divide between two sons, discouraged this tendency in the younger, but in vain. By the death of his elder brother, O. inherited all his father's property, and went, for the completion of his education, to Athens, where he acquired a perfect mastery of the Greek language. He afterwards made a tour in Asia and Sicily along with the poet Macer. It is uncertain whether, on his return to Rome, he ever practised as advocate. Although by birth entitled to aspire to the dignity, he never entered the senate; his weakness of body and indolence of habit prevented him from ever rising higher than from the position of triumvir capitalis to that of a decemvir, who convened and presided over the court of the centumviri. While his public life was unimportant, his private was that of a gay and licentious man of letters. The restraint of the matrimonial tie was always distasteful to him; twice married in early life, he soon divorced each of his wives; while he carried on an intrigue with a lady whom he celebrated as Corinna, and who is believed to have been no other than Julia, the accomplished daughter of Augustus. Before his thirtieth year, he married a third time, and became the father of Perilla, of whom he was tenderly fond. Up till his fiftieth year, he resided chiefly at Rome, in a house near the Capitol, and occasionally visited his Pelignan estate. His society was much courted, and his large circle of distinguished friends included Augustus and the imperial family. By an edict of the emperor, however, he was, in 9 A.D., commanded to leave Rome for Tomi, a town near the delta of the Danube, and on the very limit of the empire. The sentence did not condemn him to an *exsilium*, but to a *relegatio*—or in other words, he did not lose his citizenship, nor was he cut off from all hope of return. The cause of this sudden banishment has long divided the opinion of scholars, since the one mentioned in the edict—the publication of his *Ars Amatoria*—was a mere pretext, the poem having been in circulation for ten years before. His intrigue with Julia, or with Julia's daughter, and the consequent displeasure of Augustus or of Livia, have been adduced with various degrees of plausibility, as the cause of a sentence to which O. himself only mysteriously refers. The misery of his life on the inhospitable and barbarous shore of the Euxine is commemorated by the poems in the composition of which he found his solace. He became a favourite with the Tomitæ, whose language he learned, and before

whom he publicly recited some poems in honour of Augustus. But his devotion to the emperor, and the entreaties addressed to the imperial court by himself and his friends, failed to shorten the term, or to change the scene of his banishment; so he died, an honoured citizen of Tomi, 18 A. D., in his sixtieth year. His works which have come down to us, either in whole or in part, appeared in the following order: 1. *Amorum Libri III.*, a revised and abridged edition of an early series. 2. Twenty-one *Epistolæ Heroidum*. 3. The *Ars Amatoria*. 4. *Remedia Amoris*. 5. *Nux*, the remonstrance of a nut-tree against the ill-treatment it receives from the wayfarer, and even from its owner. 6. *Metamorphoseon Libri XV*. This is deservedly O's best-known work. It seems to have been written between the poet's fortieth and fiftieth years, and consists of all the transformations recorded in legend from the creation down to the time of Julius Cæsar, whose change into a star forms the last of the series. 7. *Pastorum Libri XII.*, the first six of which are all that remain. The poem is a Roman calendar versified, and describes the appropriate festivals and mythic legends from materials supplied by the old annalists. 8. *Tristium Libri V.*, written in elegiac metre, during the first four years of the poet's banishment. They are mainly descriptive of his miserable fate, and are full of appeals to the clemency of Augustus. 9. *Epistolarum ex Ponto Libri IV.*, also written in elegiac metre, and similar in substance to the *Tristia*. 10. *Ihs*, a short satire against some traducer of the poet's. 11. *Consolatio ad Liviam Augustam*, held spurious by some critics. 12. *Medicamina Faciei* and *Italiuticon*, dubiously genuine, and of which we possess but fragments. Several of his works are entirely lost, the one best known to antiquity being *Medea*, a tragedy.

The poetical genius of O. has always been admired. A masterly facility of composition, a fancy vigorous and rarely at fault, a fine eye for colour, and a versification very musical in its flow, are the merits which have made him a favourite of poets from Milton downwards, in spite of his occasional slovenliness and falsity of thought. The best editions of O.'s entire works are Burmann's (Amsterdam, 1727), and the recent one of Merkel; while excellent commentaries on one or other of his poems have been published by Haupt, Ramsay, and Paley. A good translation of his *Metamorphoses* is that edited by Garth, with the assistance of Dryden, Addison, Congreve, and others; while special passages of the same poem have been admirably rendered by Mr D'Arcy Thompson.

OVIEDO, a pleasant and healthy city of Spain, capital of the modern province of the same name (the ancient Asturias, q. v.), stands on a plain between the rivers Nalon and Nora, 61 miles north-north-west of Leon, and 22 miles south-south-west of Gijón, on the Bay of Biscay. In the centre of the city is a handsome square, from which four principal streets, terminating in alamedas or promenades, branch off toward the north, south, east, and west, respectively. These main streets are connected by others, and all are clean and well-paved. Pure water is abundantly supplied by means of a long aqueduct, and is delivered in the city by eleven public fountains. The cathedral, a beautiful cruciform specimen of Gothic, the ornamentation of which is as rich as it is elegant, contains (in the Chapel of the Virgin) the remains of many of the early kings and princes of Asturias, and has a fine old library. Some curious, but eminently questionable relics, are to be found in the church of *San Miguel*, which is the second oldest Christian building after the Moorish

invasion. In the immediate vicinity of the city there are other churches in the early Saxon style, which are among the oldest churches in the peninsula. The convent of San Vicente, founded in 1281, has been secularised, and is now occupied by government offices, &c. Linens, woollens, hats, and firearms are manufactured. Pop. about 10,000.

O. was known during the middle ages as *Civilis Episcoporum*, because many of the Spanish prelates who had been dispossessed of their sees by the Moors, took refuge here. This city, which is the see of a bishop, was twice plundered of its ecclesiastical and other treasures during the war of independence; first by Soult, and subsequently by Bonnet.

OVIEDO Y VALDES, GONZALO FER. DE, a Spanish chronicler, born at Madrid in 1478, was sent by Ferdinand to St Domingo, in the West Indies, in 1514, as intendant and inspector-general of the trade of the New World. During his long residence in St Domingo, he spent his leisure in acquiring an extensive knowledge of the West Indies; and after his return to Spain published at Toledo, in 1526, a *Summario de la Historia General y Natural de las Indias Occidentales*, which he dedicated to Charles V. He afterwards made some additions to the work, which was republished at Seville in 1535, in 21 vols., under the title of *La Historia General y Natural de las Indias Occidentales*. He left other 29 books in manuscript. A complete edition is now being prepared at Madrid. O. died at Valladolid in 1557. Besides his *History of the West Indies*, he wrote *Las Quinquagenas*, a valuable, gossiping, and anecdotal account of all the principal personages of Spain in his time, which still remains in MS. in the royal library at Madrid; and chronicles of Ferdinand, Isabella, and Charles V. A life of Cardinal Ximenes is also attributed to him.

OVIPAROUS, a term applied to animals in which reproduction takes place by eggs (*ova*). Except the mammalia, all animals are either Oviparous or Ovoviviparous (q. v.); the latter mode—which is not essentially different from the former—being comparatively rare. Even those invertebrate animals which multiply by gemmation and division, have also a true reproduction by *ova*. See EGG and REPRODUCTION.

OVOLO, a convex moulding much used in classic architecture. See MOULDING. In Roman architecture, the ovolo is an exact quarter of a circle; in Greek architecture, the curve is sharper at the top and quirked. It is sometimes used in Decorated Gothic.

OVOVIVIPAROUS, a term applied to animals of which the egg is hatched within the body of the mother, so that the young is excluded alive, although the fetus has been enclosed in an egg almost to the time of parturition. It is probable that the egg is often broken in parturition itself. Some fishes are ovoviviparous, and some reptiles; also the *Monotremata*. The Common Lizard and the Viviparous Lizard, both natives of Britain, are illustrations of the near resemblance which may subsist between oviparous and ovoviviparous animals. The distinction is much less important than might be supposed.

OVULE (Lat. a little egg), in Botany, the rudimentary seed. The Germen (q. v.) or ovary sometimes contains only one ovule, sometimes a small definite number, sometimes a large indefinite number. Ovules are to be regarded as metamorphosed buds. 'The single ovule contained in the ovaries of Composites and Grasses may be called a terminal bud, surrounded by a whorl of adhering leaves or

carpel, in the axil of one of which it is produced.'—*Bellon, Manual of Botany*. The ovule is not always contained in an ovary. In *Gymnogens* (q. v.) it is wanting, and the ovule is *naked*; but the plants possessing this character are comparatively few. The ovule is attached to the *Placenta* (q. v.), and by it to the *Carpel* (q. v.), from which it is developed. The attachment to the placenta is either immediate, when the ovule is said to be *sessile*, or by means of an umbilical cord (*funiculus*), which sometimes elongates very much after fecundation. The ovule is in general, essentially formed of a cellular *nucleus* enclosed by two membranes, the outer of which is called the *primine*, and the inner the *secundine*. At one end of the nucleus there is an opening of both membranes—the *foramen*—through which the access of the pollen in Fecundation (q. v.) takes place. The *Chalaza* (q. v.) unites the nucleus and these membranes at the base. When the ovule is so developed that the chalaza is at the base, and the foramen at the apex, it is said to be *orthotropal* (Gr. *orthos*, straight, *tropos*, a mode). When the ovule is bent, so that the foramen is brought near to the base, it is called *campylotropal* (Gr. *kampylos*, curved). When by increasing on one side more rapidly than on the other, the ovule has its foramen close to the base, the chalaza being carried round to the opposite extremity, the ovule is *anatropal* (Gr. *anatrope*, to turn upside down). Anatropal ovules are very common. When the ovule is attached to the placenta, so that the foramen and chalaza are at opposite ends, the base being in the middle, it is called *amphitropal* (Gr. *amphi*, around).—When the ovule arises from the base of the germen, it is said to be *erect*; when it hangs from the apex of the cavity of the germen, it is *pendulous*; when it arises from the side of the germen above the base, it is *ascending*; when it hangs from the side of the germen below the apex, it is *suspended*. When two or more ovules are found, not only in the same ovary, but in the same cell, they generally exhibit different modes of attachment. See CHALAZA, EMBRYO, FECUNDATION, GERMEN, PLACENTA, SEED.

OWEN, DR JOHN, an eminent Nonconformist divine, descended from an ancient Welsh family, was the son of the Rev. Henry Owen, vicar of Stadham in Oxfordshire, and was born at the vicarage in 1616. In his 12th year he was entered of Queen's College, Oxford, where he worked with amazing diligence; for years taking no more than four hours sleep a night. In 1635 he 'commenced' M.A. At this period (if his own statement does not exaggerate) his great ambition was to acquire celebrity either in church or state, he didn't particularly care which; and he affirms the irreligiosity and worldliness of his motives with entire frankness. Yet he appears, for all that, to have been agitated even during his student-life by the *questiones vexatæ* of ecclesiastical politics, and made himself so conspicuous by his Anti-Laudianism, that he was forced to leave Oxford. In fact, his Puritanism had become so decided, that most of his former friends had abandoned his society. The next five or six years of his life were spent, speaking generally, in a state of anxious and melancholy introspection. When the civil war finally broke out, O. was living as chaplain with Lord Lovelace of Hurley, in Berkshire. His lordship was a royalist, and went to join the king's army, whither O., who had warmly espoused the cause of the parliament, could not accompany him. About the same time, his uncle, a gentleman of property in Wales, who, having no children of his own, meant to have made O. his heir, ignorant at the zealous Puritanism of his nephew, settled his estate upon another, and died without leaving him a farthing. The almost friendless

scholar now removed to London, where a casual sermon, preached by a stranger in Calamy's church, had the effect of imparting to his soul the peace he so ardently desired. In 1642, he published his *Display of Arminianism*, a work that proved very acceptable to the Puritan party, and drew upon him the favourable regards of the House of Commons. Soon after, the 'Committee for Purging the Church of Scandalous Ministers' presented him with the living of Fordham, in Essex. His ministrations were exceedingly popular, people coming from great distances to hear him preach. While residing at Fordham he married a lady named Rooke, by whom he had several children. Not long after he removed to Coggeshall, where his views of church government underwent a modification. Up to this point he had been a Presbyterian, but he now became a moderate Independent or Congregationalist. It is almost superfluous to add that the Presbyterian ministers—intolerant, dogmatical, and acrimonious to a degree that is scarcely credible—fell upon him at once for his apostasy, but failed to perturb his sober temper. At Coggeshall he wrote his *Salus Electorum, Sanguis Jesu* ('The Blood of Jesus, the Salvation of the Elect'), a work the result of seven years' study, and of which he himself said that 'he did not believe he should live to see a solid answer given to it.' His fame still increasing, he was sent for in 1646 to preach before the parliament. To his discourse, entitled *A Vision of Free Mercy*, he added an Appendix, in which he pleads for liberty of conscience in matters of religion. He was again chosen to preach before the House of Commons the day after the execution of King Charles I. (January 31, 1649), but discreetly avoided a vindication of the act. About this time Cromwell made his acquaintance, and thought so highly both of his preaching and character, that he insisted on O. accompanying him to Ireland, where the latter remained about half a year. In 1650, he went with Cromwell to Scotland, and resided in Edinburgh for several months; in 1651, the House of Commons appointed him dean of Christ Church, Oxford; and in 1652, when only in his 36th year, he was admitted vice-chancellor of the university. The manner in which he discharged his duties reflects the highest credit on the impartiality of his disposition. Though himself an Independent, and owing his honours directly to the Independent party, O. never shewed himself a partisan. Most of the vacant livings in his patronage were bestowed on Presbyterians; and Episcopalians were allowed to celebrate divine worship in their own way, nor could the vice-chancellor ever be induced to offer them the slightest molestation. While at Oxford, the 'Atlas of Independency,' as Wood grandiloquently dubs O., wrote his *Diatriba de Divina Justitia*, his *Doctrine of the Saints Perseverance*, his *Vindicia Evangelica*—against Biddle (q. v.) and the Socinians—and his *Mortification of Sin in Believers*. He was one of the well-known 'tryers' appointed to 'purge' the church of 'scandalous' (i.e., royalist) 'ministers,' and in this capacity signalled himself by his friendly offices on behalf of men of learning and merit, among whom may be mentioned the celebrated Dr Edward Pococke, professor of Arabic. A coldness now appears to have sprung up between him and Cromwell. O. is said to have been opposed to what many people call the 'ambitious' designs of the Protector, and in 1657 he was succeeded as vice-chancellor of the university by Dr Conant. The year after Cromwell's death, he was ejected from his deanery, and retired to Stadham, in Oxfordshire, where he had purchased an estate, and where he formed a congregation, to which he ministered until his removal to London shortly after the Restoration.

The writings belonging to this period of retirement, if we may so call it, are, *Communion with God; On the Divine Original, Authority, Self-Evidencing Light and Power of the Scriptures; Theologoumena, or De Natura, Ortus, Progressu, et Studio veræ Theologiæ*; and an uncritical, irreflective, and unscholarly diatribe against Walton's *Polyglott*, in which the different readings of Scripture were learnedly set forth. In 1662, he published *Animadversions to Fiat Lux*, a treatise written by a Franciscan friar in the interests of Roman Catholicism. It was followed by works on *Indwelling Sin*, on the 130th Psalm, and on 'The Epistle to the Hebrews,' the last of which began to appear in 1668, and is usually reckoned O.'s *Magnum Opus*. In 1669 he published *Truth and Innocence Vindicated*, a reply to Samuel (afterwards Bishop) Parker's *Discourse on Ecclesiastical Policy*, and in 1673 became pastor of a large congregation in Leadenhall Street. His last publications of importance were a *Discourse Concerning the Holy Spirit* (1674); *Doctrine of Justification by Faith* (1677), a treatise still much admired by many; and *Christologia, or Glorious Mystery of the Person of Christ*.

O. in his later years was held in the highest esteem by many of the most influential personages in the land, such as the Earl of Orrery, the Earl of Anglesea, Lord Willoughby, Lord Berkeley, Sir John Trevor. When drinking the waters at Tunbridge, even the Duke of York and Charles II. paid him particular attention, and had long conversations with him on the subject of Nonconformity. O. died at Ealing, 24th August 1683, and was buried in Bunhill Fields. His funeral was attended by no less than sixty noblemen. O. was the most voluminous, but by no means the most powerful writer among the Puritan divines. His prolix and passionless disquisitions, his dull, tedious, and exhausting argumentations, his lack of subtle spiritual perception, his ponderous and lumbering style, make his writings the reverse of interesting; and one can almost pardon the irreverent criticism of Robert Hall, who is said to have pronounced them 'a continent of mud.' Yet O. deserves respect for his learning and moderation. The best edition of his works was published at Edinburgh (1856, *et seq.*).

OWEN, RICHARD, was born at Lancaster, July 20, 1804. Having received his elementary education at the grammar-school of that town, he became, at the age of twenty, a student in Edinburgh University. Under the guidance of the third Monro, Alison, Jameson, and Hope in the university, and of Barclay in the outdoor school, his natural talents early developed themselves. He was an active student, and with others of kindred spirit, formed the Hunterian Society, of which he was chosen president in 1825. In 1826, he removed to London, joining the medical school of St Bartholomew's Hospital; and to the Medical Society of this institution he communicated his earliest published paper: 'An Account of the Dissection of the Parts concerned in the Aneurism, for the Cure of which Dr Stevens tied the Internal Iliac Artery,' which appeared in the *Medico-Chirurgical Transactions* for 1830. It was doubted whether so deep-seated an artery could have been reached, but he shewed that the ligature had been applied to the internal iliac, and the aneurism had in this way been obliterated.

It had been his intention to enter the navy; but when he finished his education, he accepted an appointment as assistant to Mr Clift, the Curator of the Museum of the Royal College of Surgeons, and helped him in the preparation of his catalogues of 'Pathological Specimens' (1830), 'Monsters and Malformations' (1831), but chiefly of the 'Specimens of Natural History in Spirits' (1830). He had,

about this time, the fortune to obtain a specimen of *Nautilus pompilius*, an animal almost unknown, and of great importance not only in itself, but also and chiefly because of its numerous fossil allies. The results of his careful dissection of this specimen were published in an elaborate Memoir, which at once gave him a high position amongst naturalists, for the advanced views on structure and affinities it contained.

The continued examination of Hunter's extensive collections in the College of Surgeons' Museum was his great work. This resulted in the enlargement and arrangement of the collections, and in the publication of his *Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy*, which was issued in sections during 1833-1840; of his *Palaontological Catalogue*, of which the Mammals and Birds were published in 1845, and the Reptiles and Fishes in 1854; and of his *Catalogue of Recent Osteology* (1854), in which he describes 5906 specimens. The collections, which in 1828 were contained in one small badly-lighted room, in 1856, when O.'s connection with them terminated, filled ten times the original space—three large galleries having been specially erected to contain them.

O.'s position as curator of the Hunterian Museum, to which he succeeded on the death of Clift, awakened in him a special interest in its famous founder. In 1837, he published a new edition of Hunter's *Animal Economy*, adding to it all the known published papers of its author; and giving in the preface, for the first time, a descriptive narrative of Hunter's real discoveries. He afterwards edited two volumes of *Essays and Observations on Natural History, Anatomy, &c.*, by John Hunter (1861), which had been saved from Home's unprincipled and barbarous destruction of Hunter's manuscripts, by having been transcribed by Clift, who was the last articulated apprentice of Hunter. In the preface to these volumes, O. shewed the advanced views which Hunter entertained in Geology and Palaontology.

The first appointment of O. as public lecturer was to the chair of Comparative Anatomy in St Bartholomew's Hospital in 1834. Two years afterwards, he succeeded Sir Charles Bell as Professor of Anatomy and Physiology in the College of Surgeons, and was in the same year appointed by the College as first 'Hunterian Professor.' For twenty years he continued to illustrate the recent and fossil treasures of the museum, until, in 1856, he was appointed Superintendent of the Natural History Department of the British Museum, when his connection with the College of Surgeons ceased.

We have not space to record even the principal of O.'s numerous published papers. His earliest communications to the Royal Society were papers on the generation of the ornithorhynchus and of the kangaroo. In numerous Memoirs between 1835 and 1862, he expounded the structure and affinities of the higher quadrumana; and in these and other papers, he proposed the use of the brain-structure, as an important element in classification. It has been objected, that the particular parts to which he referred in characterising his highest class, are found in the lower classes; but the objectors forget that he does not use the existence of the parts as his characters, but only their remarkable development. A similar objection may be urged against every system of classification, for no decided line can be drawn around any group, the whole animal world being united by a graduation of structure.

His exposition of the recent and fossil birds of New Zealand is well known. He first published two elaborate papers on the anatomy of the Apteryx,

and then followed at intervals seven or eight monographs on the gigantic struthious Birds which once existed in these distant islands. His descriptions and restorations of extinct animals are perhaps the most important of all his labours. He has published a monograph of the British Fossil Mammalia and Birds, and six parts of an elaborate systematic history of British fossil Reptiles. In describing the fragmentary fossil relics brought home by Darwin from South America, he established many remarkable forms from very scanty materials, and shewed that there existed in America, during the Tertiary period, a mammalian Fauna, the individuals of which were, for the most part, of gigantic size, yet similar in type to the existing animals of that continent. Subsequently, he clearly expounded the various genera of huge sloths from the same region, whose remains were previously confounded or misunderstood. A series of fossils from Australia revealed to him a remarkable group of gigantic marsupials, resembling in type the present tenants of that island-continent. His latest palaeontological paper is his elaborate Memoir on the singular long-tailed bird from Solenhofen, in which he for the first time expounded the structure and affinities of that anomalous creature. But we cannot even record the titles of his multitudinous researches on extinct animals, and must refer our readers, for a summary of them, to his recent work, *Paleontology* (Edin. Black, 1861).

His great work on the microscopic structure of the teeth must be named. The *Odontography*, published in 1840—1845, contains descriptions and exquisite drawings of the minute structure of a very extensive series of the teeth of every class of animals, and forms an immense store-house of information alike to the anatomist and the geologist.

He has published original papers on every branch of the animal kingdom, living and fossil; and it has been justly said of him, that 'from the sponge to man, he has thrown light over every subject he has touched.' Some idea of the magnitude of his labours may be formed from the fact, that his published productions amount to more than 300 different papers and works, many of them being of the most voluminous and laborious character.

O., in 1835, married the only daughter of Clift, his colleague at the College of Surgeons. In 1858, he resumed his position as Fullerian Professor of Physiology in the Royal Institution of Britain, which, some 20 years before, he had filled for two sessions; and in the following year, he was appointed Keble Lecturer by the University of Cambridge. He is a Fellow and active member of most of the metropolitan scientific societies, and an honorary member of many foreign societies. In 1858, he was elected one of the eight foreign Associates of the Institute of France, in the room of the great botanist, Robert Brown. From France he also received the order of the Legion of Honour; from Prussia, the *Ordre pour le Mérite*; and from Italy, the Order of St. Maurice and St. Lazarus.

OWEN, ROBERT, a social theorist and schemer, was born on the 14th of May 1771, at Newton, in Montgomeryshire. He does not appear to have had any more than a merely commercial education to fit him for common business. The point from which his peculiar destiny in life may be said to have started, was his marriage in 1799 to the daughter of David Dale, the owner of the celebrated cotton mills at New Lanark, on the Clyde. This establishment was very successful as a money speculation, and it is curious that Jeremy Bentham made a small fortune by investing in it. Mr Dale was known to be a thorough man of business, but whether O., by his peculiar faculties for organisation, contributed to

the prosperity of the establishment in its early stages, is a doubtful question. It is certain that as his larger schemes developed themselves, he was felt to be a dangerous partner in a good business, and he was gradually elbowed out of any voice in the management, and he finally disposed of his share in the property.

It should be remembered, however, of a man whose life will go down to posterity as one long absurdity, that in his connection with New Lanark Mills he did real practical good on a scale by no means limited. He was naturally active and interfering, and being a humane man, it struck him that much degradation, vice, and suffering arose from the disorganised manner in which the progress of machinery and manufactures was huddling the manufacturing population together. He introduced into the New Lanark community education, sanitary reform, and various civilising agencies, which philanthropists at the present day are but imperfectly accomplishing in the great manufacturing districts. The mills became a centre of attraction. They were daily visited by every illustrious traveller in Britain, from crowned heads downwards, and it was delightful not only to see the decency and order of everything, but to hear the bland persuasive eloquence of the garrulous and benevolent organiser.

A factory was, however, far too limited a sphere for his ambition. He wanted to organise the world; and that there might be no want of an excuse for his intervention, he set about proving that it was in all its institutions—the prevailing religion included—in as wretched a condition as any dirty demoralised manufacturing village. Such was the scheme with which he came out on the astonished world in 1816, in his *New Views of Society, or Essays on the Formation of the Human Character*; and he continued, in books, pamphlets, lectures, and other available forms, to keep up the stream of excitation till it was stopped by his death. He had at least three grand opportunities of setting up limited communities on his own principles—one at Romney, in America; a second at Orbiston, in Lanarkshire; the third at Harmony Hall, in Hampshire, so lately as the year 1844. They were, of course, all failures, and O. attributed their failure to their not being sufficiently perfected on his principles. His life was a remarkable phenomenon, from the preternatural sanguineness of temperament which, in the face of failures, and a world ever growing more hostile, made him believe to the last that all his projects were just on the eve of success. In the revolution of 1848 he went to Paris, with hopes of course on the highest stretch; but his voice was not loud enough to be heard in that great turmoil. He appeared at the meeting of the Social Science Association at Liverpool in the autumn of 1858, with all his schemes as fresh and complete as ever, but it was their last resuscitation. He died a few weeks afterwards, on 17th November 1858.

OWL, a numerous and extremely well-defined group of birds, constituting the Linnæan genus *Strix*, now the family *Strigidae*, the whole of the nocturnal section of Birds of Prey. The aspect of the owls at once distinguishes them from all other birds, being rendered very peculiar by the large size of their heads, and by their great eyes, directed forwards, and surrounded with more or less perfect discs of feathers radiating outwards, whilst the small hooked bill is half concealed by the feathers of these discs, and by bristly feathers which grow at its base. The bill is curved almost from its base; the upper mandible not notched, but much hooked at the tip. The claws are sharp and curved, but, like the bill, less powerful than in the *Falconidae*. The outer toe is generally reversible at

are, so that the toes can be opposed two and two, to give greater security of grasp. The wings, although generally long, are less adapted for rapid and sustained flight than those of the diurnal birds of prey, and the bony framework by which they are supported, and the muscles which move them, are less powerful; the owls in general taking their prey, not by pursuit, but by surprise, to which there is a beautiful adaptation in the softness of their plumage, and their consequently noiseless flight; the feathers even of the wings being downy, and not offering a firm resisting surface to the air, as in falcons. The soft and loose plumage adds much to the apparent size of the body, and also of the head; but the head owes its really large size to large cavities in the skull between its outer and inner tables or bony layers, which cavities communicate with the ear, and are supposed to add to the acuteness of the sense of hearing. This sense is certainly very acute, and the ear is, in many of the species, very large. It is furnished with an external conch, which is found in no other birds. It is, however, concealed by the feathers, being situated on the outside of the disc which surrounds the eye; but the feathers immediately surrounding the ear are arranged in a kind of cone, serving a purpose like that of an ear-trumpet. In some species, the ear is furnished with a remarkable lid or operculum, which the bird has the power of opening and shutting at pleasure. The disc which surrounds the eye serves to collect rays of light and throw them on the pupil; and owls can see well in twilight or moonlight, but are generally incapable of sustaining the glare of day, many of them becoming quite bewildered when exposed to it, and evidently suffering pain, which they instinctively seek to relieve by frequent motion of the third eyelid or nictitating membrane of the eye. The legs and feet of owls are feathered to the toes, and in many species even to the claws.

The digestive organs much resemble those of the Falconidae, but there is no crop, and the stomach is more muscular. The gullet is very wide throughout, and owls swallow their prey either entire or in very large morsels. The largest species feed on hares, fawns, the largest gallinaceous birds, &c.; others on small mammalia, reptiles, birds, and sometimes fishes; some feed partly or chiefly on large insects.

The owl has from early times been deemed a bird of evil omen, and has been an object of dislike and dread to the superstitious. This is perhaps partly to be ascribed to the manner with which it is often seen suddenly and unexpectedly to flit by when the twilight is deepening into night; partly to the fact, that some of the best-known species frequent ruined buildings, whilst others haunt the deepest solitudes of woods; but, no doubt, chiefly to the cry of some of the species, hollow and lugubrious, but loud and startling, heard during the hours of darkness, and often by the lonely wanderer. It is evidently from this cry that the name owl is derived, as well as many of its synonyms in other languages, and of the names appropriated in different countries to particular species, in most of which the sound *Oo* or *Ow* is predominant, with great variety of accompanying consonants. Many of the owls have also another and very different cry, which has gained for one of them the appellation screech owl, and to which, probably, the Latin name *strix* and some other names are to be referred.

Some of the owls have the discs of the face imperfect above the eyes, the whole aspect somewhat approaching to that of falcons; the conchs of the ears small, and the habits less nocturnal than the rest of this family. These constitute one of the three generally received divisions in which the species are

arranged. Another division, with more perfect discs around the eyes, is characterised by the presence of two feathery tufts on the head, popularly called horns, or ears, and sometimes egrets or aigrettes. The third division is destitute of these tufts, the discs of the face are perfect, and the ears are very large. On these distinctions, and on the feathered or unfeathered toes, and other points not of great importance, are founded the genera into which the Linnean genus *Strix* has been broken down by recent ornithologists. See, for example, the characters of *Bubo* in the article EAGLE OWL.

Owls are found in all parts of the world, and in all climates. Ten species are reckoned as natives of the British Islands, some of which, however, are very rare, and about fifteen are natives of Europe. Some of the species have a very wide geographical range. One of the most plentiful British species is the WHITE OWL, or BARN OWL, or SCREECH OWL (*Strix flammea*), one of those having perfect discs around the eyes, and no aigrettes. It is about fourteen inches in its whole length. The tail is, as in most of the owls, rather short and rounded; the

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1. Great or Eagle Owl (*Bubo maximus*); 2. Snowy Owl (*Nyctea nyctea*); 3. Virginian Horned Owl (*Bubo Virginianus*); 4. White or Barn Owl (*Strix flammea*); 5. Long-eared Owl (*Otus vulgaris*); 6. Foot of Snowy Owl.

wings reach rather beyond the tail. The toes are not feathered. The head and upper parts are of a pale orange colour, marked by a multitude of small, scattered chestnut-coloured spots, and gray and brown zig-zag lines; the face and throat white. This owl very generally frequents old buildings and outhouses. It destroys great numbers of rats and mice, and deserves the protection of the farmer. The voracity of owls is wonderful, and they kill, if possible, more than they need, storing it up for future use. The barn owl is easily tamed if taken young. When irritated, it has, like some other—perhaps all—owls, a habit of hissing and snapping its mandibles together. It almost never leaves its retreat by day, unless driven out; and when this is the case, all the little birds of the neighbourhood congregate about it as an enemy which may then be safely annoyed, and the grimaces of the poor owl, blinded by the too strong light, are very grotesque and amusing. This species has been said to be an inhabitant of almost all parts of the world, but there is reason to think that similar species have been confounded.—The TAWNY OWL, BROWN OWL, or IVY OWL (*Strix*, or *Syrnium*, *striata* or *aluca*) is another of the most common British owls,

and by the worship of it in Egypt, which the Israelites imitated in making their golden calf at Mount Sinai. Yet oxen do not appear to have formed any part of the wealth of the patriarchs. The ox was probably used as a beast of burden or draught before it was valued for its milk. It is mentioned by Cæsar as a principal part of the wealth of the Britons at the time of the Roman invasion.

The ox is more frequently employed as a beast of burden and of draught in some parts of the continent of Europe than in Britain. From the earliest historic times, the horse has been more generally thus employed in Britain, and has now almost entirely superseded the ox. The gait of the ox is slow and plodding, but its strength enables it to perform a great amount of work, and it is not easily exhausted. It needs, however, intervals of rest inconvenient for the farmer; and it is not capable of exertion at all equal to that of the horse on any occasion of emergency. The ox is chiefly valuable for its flesh and its milk; but almost every part of the animal is useful—the fat, skin, hair, horns, intestines.

The period of gestation of the ox is nine months, or 270 days. It rarely produces more than one calf at a birth. It attains maturity in two or three years, becomes evidently aged at ten, and seldom lives more than fourteen. Cows are seldom kept for the dairy after they are seven or eight years old, as after that age they yield less milk and of inferior quality. Modern husbandry has also found means to fatten cattle for the market at an earlier age than was formerly usual; and although the beef is not quite so good in quality, the profit is great, both to the farmer and to the community, through the increased productiveness of the land.

The ox is gregarious, and where circumstances permit, as in the South American plains, associates in very large herds. Herds of oxen defend themselves with great vigour against the large feline animals and other assailants, the younger and weaker animals being placed in the middle, whilst the bulls in the outer rank confront the adversary with their horns.

The varieties or breeds differ very much in size. Among those which occur in the British Islands, the Shetland breed is not much larger than a calf of some of the others. Some of the breeds of the torrid zone are also very small; but the fatty hump on the back may probably be regarded as indicating a connection with the Indian ox or Zebu (q. v.), which, although it has been generally regarded as a variety of the common ox, is perhaps a distinct species.—The 'wild ox,' now existing only in a few parks, as at Chillingham and Hamilton, seems, whatever its origin, to have been formerly an inhabitant of many forest districts in Britain, particularly in the north of England and south of Scotland. The Chillingham wild oxen are of a creamy white colour, much smaller than many of the domestic breeds, of a graceful form, with sharp horns, which are not very long, and not very much curved. The uniform white colour is to be ascribed to the care taken to destroy every calf which is not perfect in this respect. The habits of these wild oxen are very similar to those of the domestic races.

—The *West Highland* breed, or *Kyloe*, differs very little from the Chillingham or Hamilton wild ox, except in being generally black. It has short muscular limbs, a wide and deep chest, well-arched ribs, and a straight back, the horns are often somewhat long; the muzzle is short but not broad; the skin is closely covered with shaggy hair. The milk is very rich, but the quantity is so small, that this breed is very unsuitable for dairy farming. The beef,

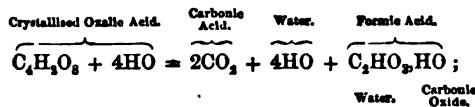
however, is of the finest quality; and great numbers of cattle, reared in the Highlands and Hebrides, are annually conveyed to other parts of the country, to be fattened on rich pastures. The breed is a very hardy one, and peculiarly suited to the region in which it prevails.—The *Galloway* breed is very like the preceding, but larger and destitute of horns, and many cattle reared in the hilly parts of Galloway are fattened on English pastures for the London market.—The *Pembroke* and other Welsh breeds are not unlike the West Highland; but the cows yield milk more abundantly.—The diminutive *Shetland* breed is very hardy, and is celebrated for the fine quality of its beef. The Shetland ox is easily fattened, even on scanty pasturage. The milk which the cows yield is also remarkably abundant in proportion to their small size. The *Ayrshire* breed is particularly celebrated for the abundance and excellence of its milk, but the beef is of inferior quality, and the animal is not easily fattened. Great care has been bestowed on this breed in Ayrshire and neighbouring counties, where dairy farming is much practised. The horns are smaller than those of the West Highland breed, the hair much smoother, and the colour chiefly brownish-red, with large patches of white.—The *Alderney* breed much resembles the Ayrshire, but the milk is comparatively small in quantity, and remarkable for the richness of the cream, on which account Alderney cows are often kept for the supply of private dairies. The milk of an Alderney cow, mixed with that of a dozen other cows, will sensibly improve the quality of the butter. But this breed is worthless for the purposes of the grazier.—The *Suffolk Dun* is a polled or hornless breed, of clumsy form, and of little value to the grazier, but yielding a very large quantity of milk, on which account Suffolk has long been celebrated for its dairy produce.—The *North Devon* is a pretty large breed, with rather short horns, very muscular and powerful, and also very gentle and docile, so that it is particularly adapted for draught; and much agricultural labour is still performed in Devonshire by teams of oxen of this breed. The North Devon breed, however, is surpassed by others, both for the purposes of the dairy farmer and of the grazier.—The *Hornford* breed, of stouter form than the Ayrshire, but

Bull (short-horn).

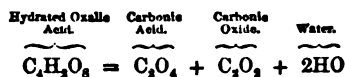
in some respects not unlike it, has long been in great repute both for its beef and its milk, but in the districts where it once prevailed, it is now giving place to the *Short-horn* breed, one of the new breeds which are the result of care and attention. The *Short-horn* breed, so called because the horns are shorter than in almost any other, originated about the beginning of the 19th c. on the banks of the Tees, and has spread very widely both

mangold in winter in Norfolk and eastern counties. Large allowances of cake and corn are there given in addition to the roots.

OXALIC ACID ($C_2O_3 \cdot 2HO + 4Aq$) occurs in colourless, transparent, oblique, rhombic prisms, which have an intensely sour taste, and are soluble in nine parts of cold water, and much more freely in boiling water. When heated to 212° , the crystals lose their four equivalents (or 28.5 per cent.) of water, and the residue, consisting of the hydrated acid ($C_2O_3 \cdot 2HO$), becomes opaque; these two equivalents of water contained in the hydrated acid, cannot be expelled by mere heat, although they can be displaced by an equivalent amount of a metallic oxide. When the crystallised acid is rapidly heated to about 300° , it is decomposed into a final mixture of carbonic acid, carbonic oxide, and water; formic acid being produced and again decomposed in the process.



and formic acid when heated yields $2HO + 2CO$. When warmed with strong sulphuric acid, it is decomposed into equal volumes of carbonic acid and carbonic oxide gases, and into water; according to the equation:



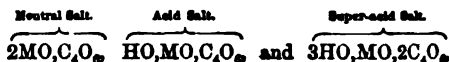
This reaction affords one of the best means of obtaining carbonic oxide for use in the laboratory. Oxidising agents, such as binoxide of manganese, peroxide of lead, nitric acid, &c., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese.

Oxalic acid is one of the most powerful of the organic acids, and expels carbonic acid and many other acids from their salts. The acid itself, and its soluble salts, are poisonous. This acid is very widely diffused throughout the vegetable kingdom. Sometimes it occurs in a free state (as in *Boletus sulphureus*), but much more frequently as a salt, either of potash, as in the different species of *Oxalis* (from which genus the acid was originally obtained and derives its name), and of *Rumex*; or of soda, as in various species of *Salicornia* and *Salsola*; or of lime, as in *Rhubarb* and many *Lichens*. In the animal kingdom, it never occurs except in minute quantity and in combination with lime. Oxalate of lime is found in a crystalline shape, both in healthy and morbid urine. In the latter, it constitutes the leading symptom of the affection termed **OXALURIA** (q. v.), while in the former it occurs after the use of wines and beer containing much carbonic acid, of sorrel, rhubarb-stalks, &c., and after the administration of the alkaline bicarbonates. It is the constituent of the urinary calculus, known from its rough exterior as the mulberry calculus. Crystals of oxalate of lime have also been found in the mucus of the gall-bladder, on the mucous membrane of the impregnated uterus, and in morbid blood. They have likewise been detected in the biliary vessels and excrements of caterpillars. In the mineral kingdom these crystals have been detected in association with crystals of calcareous spar.

Oxalic acid is produced by the action of either hydrate of potash or of nitric acid upon most organic compounds of natural occurrence. Its most

common mode of preparation is by the oxidation of starch or sugar by nitric acid. The organic compound and the nitric acid are heated in a flask till all effervescence has ceased, after which the solution is evaporated, and the oxalic acid separates in crystals on cooling.

This acid forms three series of salts, viz., neutral, acid, and super-acid, which, if M represents the metal entering into the salt, may be represented by the formulae:



the last being a compound of the acid salt and the acid. Oxalate of lime ($2CaO, C_2O_3 + 4Aq$) and ordinary (neutral) oxalate of ammonia ($2NH_3O, C_2O_3 + 2Aq$) are examples of the first; binoxalate of potash, or salt of sorrel ($KO, HO, C_2O_3 + 2Aq$), is an example of the second; while the salt usually termed quadroxalate of potash ($KO, 3HO, 2C_2O_3 + 4Aq$) is an example of the third class. Of the numerous oxalates, the most important are the oxalate of lime (in consequence of its physiological and pathological relations); the neutral oxalate of ammonia, which is the best test for the detection of lime in solution (in consequence of the extreme insolubility of the resulting oxalate of lime); and the acid oxalate of potash, which is contained in the juices of *oxalis* and *rumex*, and is employed in various manufacturing processes.

The best test for this acid is the production of a white precipitate (of oxalate of lime), on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in solution of potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives a white precipitate of oxalate of silver, which explodes when heated.

In consequence of its employment in cotton printing, bleaching straw, &c., oxalic acid is more accessible to the general public than many other poisons; and on this account instances of suicide from the swallowing of this acid are by no means uncommon. Cases of accidental poisoning, moreover, sometimes occur by its being sold by mistake for Epsom salts. Large doses destroy life very rapidly. Dr A. Taylor mentions a case in which a man died in 20 minutes after taking two ounces of the acid. Dr Christison records a case in which an ounce killed a girl in 30 minutes, and another case in which the same quantity destroyed life in ten minutes; and, as a general rule (liable to exceptions), when the dose is half an ounce or upwards, death commonly takes place within the hour. The symptoms are a hot or burning acid taste, with a sense of constriction or suffocation; vomiting, great pain in the region of the stomach, convulsions, cold perspirations and general collapse speedily follow; and respiration shortly before death becomes slow and spasmodic. With the view of converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime-water, with full draughts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid.

OXALIDEÆ, or **OXALIDACEÆ**, a natural order of exogenous plants, allied to *Geraniaceæ*; including herbaceous plants, shrubs, and trees; with generally compound alternate leaves; calyx of five equal persistent sepals; corolla of five equal unguiculate petals, spirally twisted in bud; ten stamens, usually more or less united by the filaments, in two rows; the ovary usually 5-celled, with five styles; the fruit a capsule opening by as many or twice as many valves as it has cells, or

more rarely a berry; the seeds few, attached to the axis. There are upwards of 300 known species, natives of warm and temperate climates. They are particularly abundant in North America and at the Cape of Good Hope. The flora of Britain includes only two small species of *Oxalis*. An acid juice is very characteristic of this order. Some of the tropical species produce agreeable acid fruits, as the Carambola (q. v.).—The genus *Oxalis* has a capsular fruit, and the seeds have an elastic integument, which at last bursts open and projects the seed to a distance. The species are mostly herbaceous plants with ternate or digitate—rarely simple or pinnate—leaves; a few are shrubs. The stems and leaves generally contain a notable quantity of *Binoxalate of Potash*, and have therefore a sour taste.—The COMMON WOOD-SORREL (*O. acetosella*), very abundant in shady woods and groves in Britain and most parts of Europe, a native also of North America, is a beautiful little plant, often covering the ground with its green leaves, amidst which the white or slightly roseate flowers appear. Its leaves all grow from the root, a long leaf-stalk bearing three obovate leaflets; the scape bears a single flower. There is a subterranean scaly root-stock. On account of their grateful acid taste, the leaves are used in salads and sauces. The plant is extremely abundant in Lapland, and is much used by the Laplanders. It is antiscorbutic and refrigerant, and as a infusion of it is a grateful drink in fevers. *Binoxalate of potash* is obtained from the leaves by expressing the juice, and crystallising; and is sold not only under the name of *Salt of Sorrel*, but also of *Essential Salt of Lemons*, and is used for extracting spots, and particularly iron-marks, from linen, and for other purposes. Much of it is now, however, obtained from a very different source. See OXALIC ACID.—*O. corniculata*, rare in Britain, and almost confined to the south of England, but a plant of very extensive distribution, being found in Europe, North America, India, Japan, and some of the African islands, has a branched stem, with decumbent branches, leaves very similar to those of the common wood-sorrel, and yellow flowers. Its properties agree with those of the common wood-sorrel. Many other species much resemble these in their general appearance and properties. Some of the species exhibit an irritability like that of the Sensitive Plant; generally, as in the two British species, in a slight degree, and notably only in hot sunshine, but *O. sensitiva*, an East Indian species, with pinnate leaves, possesses this property in a high degree. Some species of *Oxalis*, as *O. cernua*, a native of South Africa, are remarkable for producing large bulbils in the axils of the lower leaves. Several species have tuberous roots, and are cultivated on account of their tubers; as *O. crenata* and *O. tuberosa*, natives of Peru and Bolivia, where they are much esteemed, and both receive the name Uca. The tubers, when cooked, become mealy like potatoes. They have a slightly acid taste. *O. crenata* has been cultivated in gardens in Britain for about thirty years, but continues to be almost exclusively an object of curiosity, being too tender for the climate, and its produce very inconsiderable in quantity. Its tubers are yellow, in size and shape like small potatoes. The succulent stalks of the leaves abound in a pleasant acid juice, and make excellent tarts and preserves. *O. tuberosa* produces numerous small tubers. The Bolivians often expose them for a long time to the sun, by which they lose their acidity, become saccharine, and acquire a taste and consistence like dried figs. *O. Deppel* is a Mexican species, with a root somewhat like a small parsnip, quite free of acidity. It is much cultivated in its native country, and succeeds well in the

southern parts of England. *O. tetraphylla* and *O. crassicaulis*, natives of Mexico, and *O. enneaphylla*, a native of the Falkland Islands, also have eatable roots. Many species of *Oxalis* are much esteemed as ornaments of gardens and green-houses.

OXALURIA, or THE OXALIC ACID DIATHESIS, is a morbid condition of the system, in which one of the most prominent symptoms is the persistent occurrence of crystals of oxalate of lime in the urine. These crystals most commonly occur as very minute transparent octohedra, but sometimes in the form of dumb-bells; in order to detect them, the urine, which usually in these cases presents a mucous cloud, should be allowed to stand for some hours in a conical glass, and after the crystals have gradually subsided, the greater part of the fluid should be poured away, and the drops remaining at the bottom examined with a power of not less than 200 diameters. These crystals, which are insoluble in acetic acid, may occur either in acid or in alkaline urine. Persons who secrete this form of urine are usually dyspeptic, hypochondriacal, and liable to attacks of boils, cutaneous eruptions, and neuralgia. The oxalic acid, in these cases, is not introduced into the system with the food, but is a product of the disintegration of the tissues, and is due to the imperfect oxidation of compounds, which should normally have been converted into carbonic acid. (Anhydrous oxalic acid, C_2O_3 , obviously requires 2 equivalents of oxygen to be converted into carbonic acid, C_2O_2 , or $4CO_2$. Hence, if these two equivalents of oxygen are wanting in the system, in consequence of imperfect oxygenation of the blood, oxalic acid, in combination with lime, appears as a final excretion in place of carbonic acid.) The occurrence of oxalic acid as a persistent sediment in the urine, is not only an indication of an existing morbid condition of the system, but may give rise to two perfectly distinct dangerous complications; (1) a concretion of oxalate of lime (mulberry calculus) may be formed either in the kidney or the bladder; and (2) bad consequences may arise from the poisonous action of the oxalic acid on the digestive organs, on the heart, and on the nervous system.

The treatment is simple. Care must be taken that the patient should avoid articles of diet containing oxalic acid (such as sorrel, rhubarb, tomatoes, &c.), or readily converted into it (such as sugar), and all drinks containing much carbonic acid; while he should take plenty of exercise in the open air, without fatiguing himself; should use the shower-bath, unless he feels chilled and depressed after its application, in which case he should rub the body all over daily with a horse-hair glove; and should employ as a tonic medicine either a little nitro-muriatic acid in a bitter infusion (20 minims of the acid in an ounce and a half of Infusion of Chyretta), or five grains of citrate of iron and quinine three times daily. Under this treatment, the oxalates usually almost entirely disappear from the urine in two or three weeks.

OXENSTIERNA, AXEL, COUNT, an illustrious Swedish statesman, was born at Fano, in Uppland, 16th June 1583. He was originally educated for the church, and studied theology as well as jurisprudence at Rostock, Jena, and Wittenberg, in the last of which universities he took his degree. Although he afterwards devoted himself to public affairs, he continued all his life to take a deep personal interest in religious questions, and laboured zealously for the extension of the Protestant doctrine. After leaving the university, he visited most of the German courts, but returned to Sweden in 1603, and soon afterwards entered the service

of Charles IX., who, in 1606, despatched him as ambassador to the court of Mecklenburg. He became a senator in 1608—a dignity which had been enjoyed by thirteen of his predecessors in uninterrupted succession. Having displayed great prudence and wisdom in the settlement of certain disputes between the Livonian nobles and the town of Reval, he was appointed by Charles—now infirm from age—guardian of the royal family, and head of the regency. On the accession of Gustavus Adolphus (q. v.), in 1611, O. was made chancellor; and in 1613, acted as minister-plenipotentiary in the negotiations for peace between Sweden and Denmark. In the following year he accompanied his sovereign to Poland, and by the peace of Stolbova, in 1617, terminated hostilities between Sweden and Russia. His political sagacity was not less conspicuously shewn in his successful efforts to prevent Gustavus from marrying Ebba Brahe, a Swedish beauty, and in bringing about a match between his master and the Princess Maria-Eleonora of Brandenburg. In 1621, on the departure of the king for the Polish war, he was charged with the administration of affairs at home, which he conducted with his invariable felicity; subsequently, he was appointed governor-general of the conquered districts; and in 1629, concluded peace with the Poles on highly favourable conditions. For a while O. strongly opposed the desire of Gustavus to take part in the 'Thirty Years' War;' his hope being to see the latter arbiter of the north of Europe; but when he found that the Protestant sympathies of the king were irrepressible, he set about collecting money and troops for the perilous enterprise, with all the quiet but wonderful activity and persistency that so remarkably characterised him. After Gustavus had fairly entered on the bloody struggle, O. joined him, and conducted most of the extensive and complicated diplomacy which the course of events entailed on Sweden. The death of Gustavus for a moment paralysed him, but he instantly recovered, and heroically resolved to continue the contest with the imperialists, in spite of the visible disaffection of many of the German Protestant princes, among others, of the Elector of Saxony. The will of the dead monarch was sent to Stockholm; according to its conditions, the government—during the minority of Christina (q. v.)—was intrusted to five nobles, who empowered the chancellor to prosecute the war. His difficulties were enormous, yet by indefatigable efforts he managed partly to allay the discontents, jealousies, and rivalries of the Protestant leaders. The disastrous defeat of the Swedes at Nordlingen in 1634, and the perplexities which followed it, would have stupified most men in the position of O., but it only called out more energetically his splendid diplomatic genius. Transferring the leadership of the Protestant forces to Duke Bernhard (q. v.) of Weimar, he proceeded, in 1635, to France and Holland, and formed alliances with these countries. Returning to Germany, he assisted in quelling a mutiny among the Swedish troops at Magdeburg; put Pomerania in a state of defence, to resist the meditated attack of the Elector of Brandenburg; renewed the treaty with Poland; and leaving Baner in command of the Swedes, returned to Stockholm in 1636, where he was received with the liveliest enthusiasm. He still continued, however, to direct ably the policy of the Protestants in Germany, till the peace of Westphalia, in 1648, put an end to the war. O.'s son was one of the Swedish envoys who signed the treaty, and it is in a letter to him that the famous sentence of the statesman occurs, *Nescis, mi fili, quantilla prudentia homines regantur*—('You do not yet know, my son, with how little wisdom men are governed'). Christina, who

had been declared of age in 1644, did not shew a proper respect for the advice of O.; and after she had—through mere feminine wilfulness—abdicated in spite of all his protestations, he withdrew from public life, and died 28th August 1654, shortly after she had left Sweden. He entertained a genuine affection for the daughter of his noble master, and in his last moments her name was upon his lips. Some treatises and historical fragments are attributed to him, and his 'Journal' has been published in the 'Stockholm Magazine.' See Lundblad's *Svensk Phutarch* (2 vols. Stock. 1824); Fryxell's *History of Gustavus Adolphus*; and Geijer's *History of Sweden*.

OX-EYE. See CHRYSANTHEMUM.

O'XFORD, an ancient and famous city and seat of learning in England, the chief town of the county of Oxford, is situated on the north-east bank of the Isis, a tributary of the Thames, a little above the point where it is met by the Cherwell. Both streams are crossed by numerous bridges, of which the finest are Folly Bridge over the Isis, and Magdalen Bridge over the Cherwell. Lat. of the city, 51° 45' 55" N., long. 1° 15' 29" W. Distance from London, 55 miles west-north-west. Pop. (1861) 27,560. O. occupies an undulating site, is surrounded by rich and wooded meadows, and presents to the eye of the approaching visitor a scene of unequalled architectural magnificence—spires, and towers and domes rising as thickly as chimney-stalks in the manufacturing towns of Lancashire or Yorkshire. The four main streets of O. meet at right angles near the centre of the town, at a place still called Carfax, a corruption of *Quatre rois*, and which appears in Agas's map (*temp. Elizabeth*) as *Cater roys*. These are—Cornmarket Street, leading into St Giles's, and running due north; Queen Street, leading to the railway-stations, and running west; St Aldate's Street, leading to the Isis, and running due south; and High Street, which is the chief street of the city, gracefully curving in an easterly direction, and conducting to the river Cherwell, a smaller river joining the Isis soon after it has passed Oxford.

The western half of the town is the most uninteresting; and it is a misfortune that the railway-stations are placed here, as travellers, on arriving, are introduced to the meanest parts of the city first. The county courts and jail, and the remains of the castle, from which the Empress Maud escaped while it was besieged by King Stephen, will be observed in passing. There is one good street in this part—viz., Beaumont Street, built on the site of the ancient Beaumont Palace, in which Richard I. was born. At the end of this street stands Worcester College. Passing to the north from Carfax, along the Cornmarket, the old tower of St Michael's Church is seen, against which stood formerly the north gate of the city; next St Mary Magdalen Church; then the Martyr's Memorial, with the Taylor and Randolph Buildings on the left, and part of Balliol College and St John's College on the right. St Giles's Church is at the north end of this street, which is very wide, and has a row of elm-trees on each side, forming a picturesque avenue like a foreign *boulevard*. Beyond this, to the north, is the Radcliffe Observatory and Infirmary. The High Street is about 1000 yards in length; it is reckoned one of the noblest streets—architecturally considered—in Europe, and contains, among other edifices, part of the buildings of Magdalen College, Queen's College, All-Souls' College, University College, and St Mary's and All-Saints' Churches. Parallel to it is Broad Street, in which are situated Balliol, Trinity, and Exeter

arose, as has been already said, partly instead of the old halls, and were partly at first connected with the monasteries, it being by means of these institutions that benevolent persons were enabled to give permanent support to poor secular scholars. University and Balliol, which now rank as the oldest colleges, were in point of fact halls supported by endowments held in trust for the maintenance of their students. The originator of the collegiate system, in anything like its present form, was Walter de Merton, who, besides having founded Merton College, is entitled to the honour of having mainly contributed to fix the university in its present site. All those on the foundation of the colleges before the Reformation were called Clerici. The great majority of the fellows were required to take priest's orders within a certain period after their election. This requirement of course involved celibacy, which, besides, was expressly imposed in some colleges; and practically, in old times as now, was enforced by the rule of life and the obligation of residence. The colleges are now, and for long have been, the university. All students must belong to some college or hall; and the members of these societies furnish the governors and teachers, and learned men of the university. With a few exceptions, the professors, even since the recent extension of the professoriate, are, or have been, fellows of colleges.

Previous to the statute 17 and 18 Vict. c. 81, the constitution of the university was as follows: 1. The Hebdomadal Board, or Weekly Meeting, consisting of the Heads of Houses and the two Proctors, which body exercised the chief share of the administration of the university, and possessed the exclusive power of initiating legislation; 2. Congregation, consisting of certain university dignitaries, which met merely for the purpose of conferring degrees; 3. Convocation, consisting of all Masters of Arts, a body whose consent was necessary before any of the measures proposed by the Hebdomadal Board could become law, which elected the chancellor, the two representatives of the university in parliament, several of the professors, and dispensed the ecclesiastical patronage of the university. The statute referred to introduced important changes. The Hebdomadal Board has been changed into the Hebdomadal Council, consisting of the chancellor, the vice-chancellor, the proctors, six heads of houses, six professors, and six members of convocation of not less than five years' standing—such heads, professors, and members of convocation, being elected by congregation, and holding office for six years. Congregation, again, now consists of all the great officers of the university, the professors, the public examiners, and all residents; and on this body is now bestowed the power of accepting or rejecting, and of amending any statute framed by the Hebdomadal Council. The composition and powers of Convocation remain unchanged. The students not on the foundation are, or rather were divided, according to their rank or wealth, into Peers and the eldest sons of Peers, Fellow-Commoners, Commoners, and Servitors. The latter, properly so-called, have disappeared from every college but Christ Church, though at several of the other colleges there is an inferior class nearly resembling them, called 'clerks,' 'Bible-clerks,' &c. The distinction between commoners and fellow-commoners, resting merely upon money, has been long disapproved of by those best able to judge of its effects, and is gradually disappearing. The privileges of Peers, &c., may be waived at pleasure, and some colleges will only receive men of rank, on condition that these privileges are to be waived.

Indeed, the best colleges, such as Balliol, have long refused to recognise any of the above distinctions. It is very difficult to ascertain the actual number of students at any one time in Oxford, but now it is probably seldom above 1400.

There are four terms in each year—viz., Michaelmas Term, which begins on the 10th of October and ends on the 17th of December; Hilary Term, which begins on the 14th of January and ends the day before Palm Sunday; Easter Term, which begins on the 10th day after Easter Sunday and ends on the day before Whitsunday; Trinity Term, which begins on the Wednesday after Whitsunday and ends on the first Tuesday in July. Fall Term, as it is called, does not begin till the first day of the week after the first congregation is held. By undergraduates, Michaelmas and Hilary Terms are kept by six weeks' residence, and Easter and Trinity Terms by three weeks each; but more than this is required by most of the colleges. Twenty-six weeks may be taken as the ordinary length of the academic year. Twelve terms of residence are required for the degree of B.A. from all except peers, baronets, knights, &c.; and their eldest sons, if *matriculated as such*, who are allowed to go up for their degree after eight terms' residence, but not until their twelfth term from matriculation. The degree of M.A. is obtainable in the twenty-seventh term after matriculation; in the privileged cases, in the twenty-third. By a statute passed in 1850, the following examinations were made necessary for a degree in arts. 1. Responses, called 'Little Go' or 'Smalls' in the familiar language of undergraduates, to be passed previous to the 6th term. Subjects: one Latin and one Greek author—or portions of them, as five books of Homer, five of Virgil, two Greek plays, &c.—with a paper of grammatical questions; a piece of English to be translated into Latin; two books of Euclid, or algebra up to simple equations inclusive; and arithmetic. 2. The First Public Examination, or Moderations, to be passed between the 7th and 10th terms. Subjects: the Four Gospels in Greek (except in the case of persons not members of the Church of England, when some one Greek author is to be substituted); one Greek and one Latin author, not the same as those offered for responses, and one must be a poet, the other an orator; a piece of English into Latin, and a paper of grammatical questions; logic, or three books of Euclid, and algebra. Honours are awarded at this examination both in classics and pure mathematics. Candidates are recommended to take up especially poets and orators. Verses, as well as Greek and Latin prose-writing, are required, and a paper of grammatical and philological questions is set. In the mathematical school, which in this examination exists as a separate school for honours only, candidates are examined in pure mathematics up to the Integral Calculus and the Calculus of Finite Differences inclusive. The main design of this examination was to improve pure scholarship in Oxford, but it is understood not to have answered its purpose very successfully. 3. The Public Examination, held twice a year, to be passed as early as the 12th; and for honours, not later than the 18th term of standing. There are Four Schools, in Oxford phraseology, at this examination, two of which must be passed to obtain the degree of B.A. The First School, to be passed first, and by all, is called the School of Literæ Humaniores. Subjects: the Four Gospels and the Acts of the Apostles in Greek; the subjects of the Books of the Old and New Testaments; the evidences and the Thirty-nine Articles with Scripture proofs (in the case of persons not members of the Church of England, an

extra author, Greek or Latin, may be substituted for divinity); one Greek and one Latin book, a philosopher and a historian, not the same as had been brought up at responsions. Candidates for honours in this school—which are, par excellence, the honours of the university—take up ‘the Greek and Latin languages, Greek and Roman history, chronology, geography, antiquities, rhetoric and poetics, moral and political philosophy.’ These subjects may be illustrated by modern authors. Butler and Bacon are the favourite modern books taken up. The poets and orators having been taken up at moderations, the ancient historians and philosophers form the bulk of the books in this school. Plato has of late years been much taken up. ‘Questions to be answered, passages to be translated, and subjects to be treated in Greek, Latin, and English will be proposed by the examiners.’ Second School—Mathematics. For ‘a pass,’ the first six books of Euclid, or the first part of algebra; for honours, mixed as well as pure mathematics. Third School—of Natural Science. For ‘a pass,’ an acquaintance with the principles of two of the following branches of science—mechanical philosophy, chemistry, physiology; for honours, an acquaintance with the principles of the three branches of science named above, and an accurate knowledge of some one branch of science. Fourth School—Law and Modern History. For ‘a pass,’ either (first period) History of England from the Conquest to the accession of Henry VIII., with the first volume of Stephen’s *Blackstone*; or (second period) History of England from the accession of Henry VIII. to that of Queen Anne, with the second volume of Stephen’s *Blackstone*. *Justinian* may be taken up instead of *Blackstone*. Candidates for honours are expected to add, for the first part, appropriate parts of Gibbon, Guizot, Sismondi, William of Malmesbury, and Milman’s *Latin Christianity*; for the second part, portions of Clarendon, Robertson, Ranke, and Sismondi. In law, candidates for honours are expected to add Wheaton, Vattel, or Grotius. In 1864, a statute was passed introducing a slight but important modification. Candidates for degree, instead of being required to pass through two schools at the final examination, will now be allowed their degree after passing through one school only: provided, 1, that they shall have obtained a third class in some one school; and 2, that they shall have taken up at least three books at moderations. The beneficial effects anticipated from this change are twofold: 1, at the end of a year and a half any man whose tastes lead him to a special line of study, may give up classics if he will read for honours in something else; and 2, a far greater number of men will, it is hoped, be induced to read for honours than at present, and reading for honours is a totally different thing from reading for a pass. Examinations also take place for degrees in law, medicine, divinity, and music; but these are in great measure formal. The examinations for degrees in arts are the proper work of the university.

Besides these honours, various distinctions are conferred by the university. There are several university scholarships, more particularly the Vinerian law fellowships and scholarships; the Eldon Law scholarship; two Sanscrit and five Hebrew scholarships; two mathematical scholarships; the Hertford scholarship, for the encouragement of the study of Latin, and the Ireland scholarship, for the encouragement of the study of Greek. There is also the Newdigate prize for the best composition in English verse; and the three chancellor’s prizes for the best compositions in Latin verse, Latin prose, and English prose; the Gaisford prizes for Greek

composition; and the Arnold and Stanhope prizes for the best essays on an historical subject. But the great prizes are the scholarships and the fellowships. By the commissioners under 17 and 18 Vict. c. 81, these have been for the most part thrown open, and are now awarded after examination without restrictions as to kin or place of birth. At All-Souls, and also at St John’s College, since the labours of the commissioners, an attempt has been made to keep up the former exclusiveness. The scholarships, which are so numerous as to be within the reach of any young man of ability, range from £60 to £80 a year, with rooms free, which, together with an exhibition from school, would go a considerable way towards defraying the expense of a university education. At the close of this education come the fellowships; and it has been calculated that when the arrangements of the commissioners are complete, there will be between 20 and 30 fellowships, varying from £200 to £300 per annum, open yearly to competition.

Oxford is, of course, chiefly fed from the great English schools—of late years, perhaps, more especially from Eton and Rugby. A close connection subsists, by the terms of the foundation, between Winchester and New College, between Westminster and Christ Church, and between Merchant Taylor’s and St John’s. For the nature of this connection, see under these colleges. A student desirous of going to Oxford, must apply to the Head of the College to which he wishes to belong. Application should be made early, as all the good colleges are filled up for several years in advance. But the Heads are understood to reserve to themselves the power of giving rooms at once to any young men who may have distinguished themselves at the yearly examination for scholarships, even though their names may not have been before on the list. There is no university examination at matriculation; but all the good colleges have such an examination before they receive any one—the standard of the examination, of course, varying with the college. After being received into the college, each undergraduate is assigned to a college tutor, who exercises a special control over his reading; but he also attends the instruction of the other college tutors or lecturers, as the course of his studies may require. The cost of tuition varies at different colleges, but an average of £65 may be given as paid by the undergraduate during his whole career. This payment is at some colleges distributed over three, at others over four years. Besides this, almost every undergraduate finds it necessary, at some period before taking his degree, to read with a private tutor, whom he chooses for himself. Private tuition has grown to be quite an institution in Oxford, though not formally recognised. Many of the ablest young men, after taking their degree, remain in Oxford for a year or two, taking private pupils. Much discussion has taken place on the merits and faults of this system; but, on the whole, it must be allowed to be useful for the tutor, as clearing up and concentrating his knowledge, while, at least to undergraduates who read for honours (with a few rare exceptions), it may be considered as absolutely necessary. Private tutors usually charge £10 a term for three hours a week. Previous to 1852, the professoriate of Oxford was strictly ornamental. A great effort was then made to stir it into life, which has been partially successful. New professorships were created, and the endowments of old ones were increased by the commissioners, under 17 and 18 Vict. c. 81. But the former of these measures, at least, whatever it may have done for the interests of science, has produced but little effect on the undergraduates. They still limit their

range of studies by the requirements of the examinations of the schools, and it were hard to expect them to do otherwise. But professorial teaching has undoubtedly become more popular in the ordinary branches of study. Lectures by the professors of Law and Modern History, of Moral Philosophy, Logic, Greek, and Latin are felt to be useful, and are therefore well attended. With regard to the expenses of Oxford, it is difficult to say anything very definite. They vary at different colleges, not only indirectly from the tone of the society, but even directly from the charges made for necessities. A man should be exceedingly comfortable at Oxford with £300 a year; on £200, he can manage with economy. Very few young men could, with prudence, be exposed to the difficulties of living in Oxford on less than the latter sum. There have indeed been instances of men passing creditably through the university course on £100 a year; but these are exceptional cases, and require great firmness to resist temptations. The necessary expenses, however, do not exceed that sum; the habits of the young men themselves cause a great part of the expenses. Discipline inside the college is maintained by the head of the house and the tutors; in the town and its neighbourhood, by the proctors, who are university officers invested with great authority. The former cannot be very strict without a system of espionage, and of giving weight to what are called 'privileged communications'—unworthy means too often resorted to even in good colleges. Men have been often punished without being heard in defence—the names of their accusers being kept from them, the very nature of their offence not being mentioned. Such injustice often gives rise to great and well-founded discontent. Doubtless the matter is attended with difficulty; but anything like unfairness or secrecy should be always avoided in dealing with young men. Perhaps the tutors at Oxford interfere too much with the private life of the undergraduates. Such matters are best regulated by the general tone of the place, which is, on the whole, good. At the best colleges, a young man may perhaps be led into folly; very seldom into vice or meanness. As a rule, the proctorial authority is openly and wisely exercised. The aggregate revenue of the colleges and the university must considerably exceed £200,000 a year.

The following is a list of the colleges and halls as they rank in the university; an account of each will be found in its alphabetical place: University, Balliol, Merton, Exeter, Oriel, Queen's, New College, Lincoln, All Souls, Magdalen, Brasenose, Corpus Christi, Christ Church, Trinity, St John's, Jesus, Wadham, Pembroke, Worcester, St Mary Hall, Magdalen Hall, New Inn Hall, St Alban Hall, St Edmund Hall. To these may be added Litton's Hall, being a private hall under the mastership of the Rev. Edward Arthur Litton, in virtue of a statute passed in 1855, empowering any M.A. of a certain standing to open a private hall on his obtaining a licence from the vice-chancellor. The idea has not proved popular; neither this hall, nor one which was some time ago opened by the Rev. George Butler can be said to have succeeded.

Among the books which may be consulted with regard to Oxford are—Ayliffe's *History of Oxford*, Wood's *Annals*, the *University Calendar*, and above all, the *Report of the Royal Commissioners for 1852*. The ordinances issued by the commissioners under 16 and 17 Vict. c. 11, have been lately published by Macmillan & Co., in an accessible form, and will be found to contain the latest information as to the government of the colleges.

OXFORD BLUES. See HORSE GUARDS,

OXFORD CLAY, the principal member of the Middle Oolite series, is a bed of stiff dark-blue or blackish clay, sometimes reaching a thickness of 600 feet. There occur in its lower portion in some places layers of tough calcareous sandstone, called Kelloway Rock, from a place in Wiltshire, where it is quarried. The O. C. lies beneath the plain on which Oxford is built, and extends south-west and north-east from the shore at Weymouth to the fen lands south of the Wash, thence it may be traced through Lincoln into Yorkshire, until it disappears under the sea at Scarborough. The close packing of the fossils in the fine compact clay has caused them to be beautifully preserved; the shells frequently retain their iridescence, and even the softer parts of the cephalopods have sometimes left with tolerably clear definition their form in the clay. The fossils are, however, often filled with iron pyrites, which, on exposure to the atmosphere, readily decomposes and destroys all traces of the beautiful organism. The remains of chambered shells of the genera belemnites and ammonites are very abundant, and with them are associated other shells, interesting crustacea, and the species of fishes and reptiles which are characteristic of the oolite.

OXFORDSHIRE, an inland county of England, bounded on the S. by the river Thames, on the E. by Bucks, and on the W. by Gloucestershire. Area, 472,717 acres. Pop. (1861) 171,233. The surface, where it is not level, is undulating. In the north-west the hills rise in Broom Hill to 836 feet above sea-level, and in the south-east of the county are the Chiltern Hills (q. v.), rising near Nutfield to 820 feet in height. It is watered along its southern border by the Thames, and the other chief rivers are the Windrush, Evenlode, Cherwell, and Thame, affluents of the Thames. By means of the Oxford Canal, which joins the Thames at Oxford, the towns and districts lower down the river (Abingdon, Wallingford, &c.), are supplied with coal from the Leicestershire coal-fields. The soil is fertile; the state of agriculture is advanced, about 400,000 acres are either under crop or in pasture; and the county may be considered one of the most productive in the country. Three members are returned to the House of Commons for the county.

OXIDATION is the term applied to the union of any body with oxygen, the body being then said to be *oxidised*, and the resulting compound being termed an *oxide*. Many bodies possess the property of entering into several distinct combinations with oxygen. For example, manganese (Mn) forms no less than six such compounds—viz., MnO , Mn_2O_3 , Mn_3O_4 , MnO_2 , MnO_3 , Mn_2O_7 , which represent different stages of oxidation.

OXIDES, METALLIC, are the most important of all the compounds of the metals, and in many cases occur naturally as abundant and valuable ores. They are divided by chemists into three classes—viz., (1) basic oxides or bases, (2) saline or indifferent oxides, and (3) acid oxides or metallic acids. The different oxides of the same metal usually afford illustrations of two, and not unfrequently of all three of these classes. Thus (to take the case of manganese referred to in the last article) the protoxide (MnO) is a powerful base, the red oxide (Mn_2O_3) is a saline or indifferent oxide, shewing little tendency to combine either with acids or alkalies, while permanganic acid (Mn_2O_7) presents all the properties of an acid. 'As a general rule, the greater the number of atoms of oxygen which an oxide contains, the less is it disposed to unite with the acids; on the contrary, it frequently possesses acid properties, and then unites with bases

to form salts. Protoxides generally are strong affinitive bases; they require one equivalent of a monobasic acid to form neutral salts. Sesquioxides are weaker bases; their salts are usually unstable; they require three atoms or equivalents of a monobasic acid to form a salt which is neutral in composition, though it may not be neutral to test-paper; and in general, all oxides require as many equivalents of acid as they contain atoms of oxygen in their composition. Some of the metallic acids, like the stannic and titanous, contain two atoms of oxygen to one atom of metal, but most of them contain three atoms of oxygen—such, for example, as the manganic, ferric, chromic, tungstic, molybdic, and vanadic acids; whilst in a few cases, such as the arsenic, antimonous, and permanganous, the proportion of oxygen is still higher.—Miller's *Inorganic Chemistry*, 2d edit. p. 314.

Of the basic oxides, which form by far the most important class, it may be observed that they are devoid of all metallic appearance, and present the characters of earthy matters, and that six only of them are soluble in water to any considerable extent—viz., the three alkalis, and baryta, strontia, and lime. All the oxides are solid at ordinary temperatures, and as a general rule, the addition of oxygen to a metal renders it much less fusible and soluble; the protoxide of iron, the sesquioxide of chromium, and molybdic acid being the only oxides that melt more readily than the metal from which they are produced.

OXLEYA, a genus of trees of the natural order *Crotaceae*, of which one species, *O. xanthoxyloides*, the Yellow Wood of Eastern Australia, is a very large tree, 100 feet high, valuable for its timber, which is yellow, and is used for building boats, and for various kinds of carpentry.

OXPECKER. See **BEAK-EATER**.

OXUS, the ancient name of a great river in Central Asia, which is called by the Turks and Persians *Jihūn*, and *Amū* or *Amū-Daria* by the natives of the country through which it flows. The O. rises in Lake Sari-kol, in or near the Bolar Mountains; flows first west, and then in a general north-westerly direction through the countries of Buldukhan, Bokhara, and Khiva, and empties itself by several mouths into the Sea of Aral at its southern extremity. In the first part of its course, its volume is increased by numerous affluents, but it receives no tributaries after entering Khiva, from which point its course is wholly through a dry sandy desert. Its total length is about 1150 miles, and it drains an area estimated at 221,250 English square miles. A very remarkable fact in connection with this river is the unanimous testimony of antiquity (with the exception of Pomponius Mela) to the fact of its flowing into the Caspian Sea. Strabo and Ptolemy, the two great geographers of ancient times, distinctly assert this; and the former states that merchandise from the interior of Eastern Asia was brought down by this river to the Caspian Sea, and thence to the Euxine by land-transit; and others state that they have discovered traces of the debouchure of a large river (which could be no other than the O.) in the Bay of Balkan, an inlet on the east side of the Caspian Sea. The supposed course of the O. coincides with its present one as far as lat. 40° 30' N., and long. 61° 30' E., near Hazrasp, from which point it took a west-south-west direction, and joined the Caspian by three mouths, the most northerly and largest of which skirted the south of the great Balkan range, and fell into the Bay of Balkan; while the most southerly fell into the Bay of Adji Bojar, 70 miles south of

the former. The O. was the boundary of the empires of Cyrus and Alexander.

OXYACIDS. When Lavoisier, in 1789, gave the name of oxygen to the *Dephlogisticated Air* discovered, in 1774, by Priestley, he believed that the presence of that body was essential to the existence of an acid, and this view was supported by the composition of the principal acids which were then known, such as sulphuric, nitric, carbonic, and phosphoric acids. But, by degrees, acids were discovered into which no oxygen entered, but which always contained hydrogen, and hence acids were divided into two great classes, the *oxyacids* and the *hydracids*; oxygen being supposed to be the acidifying principle in the former, and hydrogen in the latter. At the present day, scientific chemists usually restrict the term *acid* to compounds into which hydrogen enters, and the acids are regarded as salts of the last-named element; thus, sulphuric acid (H_2SO_4) and nitric acid (HNO_3) are the sulphate and nitrate of oxide of hydrogen; hydrochloric acid (HCl) is chloride of hydrogen, &c.

OXYCHLORIDES, chemical compounds containing both chlorine and oxygen in combination with some other element or radical. Chloride of lime (CaOCl), chloride of potash (KOC), oxychloride of lead or Turner's yellow (PbCl_2PbO) belong to this class.

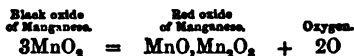
OXYGEN (symbol O, equivalent 8, specific gravity 1.1056) is a colourless, inodorous, tasteless gas, which has never been reduced by cold and pressure to a liquid or solid condition. Its chemical affinities for other elementary substances are very powerful; with most of them, it is found in combination, or may be made to combine, in more than one proportion; with several in four, five, or six proportions; and there is only one element (fluorine) with which it does not enter into any combination. Owing to the intensity with which many of these combinations take place, this gas has the power of supporting Combustion (q. v.) in an eminent degree. Of all known substances, it exerts the smallest refracting power on the rays of light. It possesses weak but decided magnetic properties, like those of iron, and like this substance, its susceptibility to magnetisation is diminished or even suspended by a certain elevation of temperature. It is only slightly soluble in water; 100 cubic inches of that liquid dissolving 4.11 cubic inches of gas at 32°, and only 2.99 inches at 59°.

Oxygen gas is not only respirable, but is essential to the support of animal life; and hence it was termed *vital air* by some of the older chemists. A small animal placed in a bell-glass containing pure oxygen will not be suffocated so soon as if it were placed in the same glass filled with atmospheric air. For further details on this property of oxygen, the reader is referred to the article **RESPIRATION**.

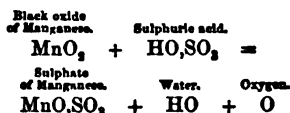
Oxygen is the most abundant and the most widely distributed of all the elements. In its free state (mixed but not combined with nitrogen), it constitutes about a fifth of the bulk, and considerably more than a fifth of the weight of the atmosphere. In combination with hydrogen, it forms eight-ninths of all the water on the globe; and in combination with silicon, calcium, aluminium, &c., it enters largely into all the solid constituents of the earth's crust; silica in its various forms of sand, common quartz, flint, &c.—chalk, limestone, and marble—and all the varieties of clay, containing about half their weight of oxygen. It is, moreover, found in the tissues and fluids of all forms of animal and vegetable life, none of which can support existence independently of this element.

There are various modes of obtaining oxygen, the

simplest of which consists in the exposure of certain metallic oxides to a high temperature. It was originally obtained by its discoverer, Dr Priestley, from the red oxide of mercury, which, when heated to about 750°, resolves itself into metallic mercury and oxygen gas. It may be similarly obtained from red oxide and peroxide of lead, the resulting products in these cases being protoxide of lead and oxygen. The following are the chief methods now employed: (1.) The black oxide (or binoxide) of manganese (MnO_2) is much employed as a source of this gas. The mineral is reduced to small pieces of about the size of a pea, and introduced into an iron bottle, with a pipe through which the gas may escape. When the bottle is placed in a furnace, and attains a red heat, the mineral parts with one-third of its oxygen, and the red oxide of manganese (MnO, Mn_2O_3) remains behind; the reaction being explained by the equation:



(2.) A very pure and abundant supply of oxygen may be obtained by heating chlorate of potash (KO, ClO_3), which yields up all its oxygen (amounting to 39·16 per cent.), and leaves a residue of chloride of potassium. One ounce of this salt yields nearly two gallons of oxygen gas. It is found by experiment, that if the chlorate of potash is mixed with about a fourth of its weight of black oxide of copper, or of binoxide of manganese, the evolution of the gas is greatly facilitated, although the oxides do not seem to undergo any change during the process. (3.) Oxygen is readily obtained by heating strong sulphuric acid with about half its weight of powdered black oxide of manganese, or chlorate of potash, in a glass retort; the reaction in the former case being expressed by the equation:



and in the latter case, being of a more complicated character. (4.) Various processes have been proposed for obtaining the gas on a large scale, of which the following, recommended by St Claire Deville and Debray, is perhaps the best: The vapour of hydrated sulphuric acid is passed over red-hot platinum, by which it is decomposed into oxygen and sulphurous acid, the latter of which may easily be separated (and made available for the formation of sulphites) by its solubility in water or alkaline solutions. It has been calculated that a cubic metre (35·375 cubic feet) of oxygen costs 8s. 4d. when obtained from chlorate of potash; nearly 4s. 1d. when obtained from manganese; and only 10d. when obtained from sulphuric acid.

Of the compounds of oxygen, it is unnecessary to speak here, as they are described in the articles on the other chemical elements.

Oxygen was discovered almost simultaneously, in the year 1774, by Priestley and by Scheele, the English chemist having the precedence by a few weeks. Priestley gave it the name of *Dephlogisticated Air*; Scheele termed it *Empyreal Air*; Condorcet shortly afterwards suggested *Vital Air*, as its most appropriate designation; and in 1789, Lavoisier, who, by a series of carefully conducted and very ingenious experiments, proved that the combustion of bodies in the air consisted essentially in their chemical combination with oxygen, and thus overthrew the *Phlogiston* (q. v.) theory, gave it the name which it now retains, in consequence of his (erroneously)

believing that it possessed a certain property which is described in the article *OXYACIDS*.

OXYHYDROGEN MICROSCOPE. See *SOLAR MICROSCOPE*.

OXYRHYNCHUS, the name of a celebrated Egyptian fish, said to be revered throughout Egypt, and sacred to the goddess Athor. Its name in Egyptian is *kha*, and the fish in the hieroglyphs was used for this syllable, and particularly expressed the idea of the body. In the ritual, the deceased particularly stated that he had not caught this fish. The name appears to have comprised the genus *Mormorus*, distinguished by its pointed nose and long dorsal fin. The fish was worshipped in one of the nomes, which was called after it, and the inhabitants held it in such reverence that they would not touch any fish captured by a hook. When the portions of the body of Osiris were flung into the Nile, this fish alone ate one portion of his body. The O. was not eaten in Egypt, except by the natives of the Cynopolites Nomos. Its modern name is *Mizleh*, which seems retained in the Coptic Pemege, the name of the city of Oxyrhynchus. It is represented both in the sculptures and on the coins of the Nome, and was anciently embalmed.—The city of Oxyrhynchus is the modern Behneseh, lying on the west bank of the Nile, in Lower Egypt, near the Bahr-el-Jusuf.

OXYURIS VERMICULARIS is the name now assigned by most zoologists to the intestinal worm described as *Ascaris* (q. v.) *vermicularis*, yet it is the original and true *Ascaris*. For the mode of recognising the presence of this worm, and treating patients suffering from its presence, the reader is referred to the articles *VERMIFUGES* and *WORMS*.

O'YER and T'ERMINER (Fr. *ouïr*, to hear; *terminer*, to determine). A commission of oyer and terminer is granted by the crown to the judges and others to hear and determine all treasons, felonies, and trespasses; and it is by virtue of this commission that the judges on circuit dispose of criminal cases in the various circuits. Sometimes a special commission of the same kind is issued, authorising the judges to go and try prisoners at other than the ordinary times.

OYSTER (*Ostrea*), a genus of lamellibranchiate molluscs, of the section with a single adductor muscle. See *LAMELLIBRANCHIATA*. The shell consists of two unequal and somewhat irregularly shaped valves, of laminated and coarsely foliated structure; and the hinge is without tooth or ridge, the valves being held together by a ligament lodged in a little cavity in each. The animal is, in its organisation, among the lowest and simplest of lamellibranchiate molluscs. It has no foot; and, except when very young, no power of locomotion, or organ of any kind adapted to that purpose. Its food consists of animalcules, and also of minute vegetable particles, brought to it by the water, a continual current of which is directed towards the mouth by the action of the gills. The gills are seen in four rows when the valves of the shell are separated, a little within the fringed edge of the mantle. In the most central part is the adductor muscle; towards the hinge is the liver, which is large; and between the adductor muscle and the liver is the heart, which may be recognised by the brown colour of its auricle. The mouth—for, as in the other lamellibranchiata, there is no head—is situated beneath a kind of hood, formed by the union of the two edges of the mantle near the hinge. It is jawless and toothless. The ovaries are very large during the season of reproduction, which extends over certain months in summer, when oysters are out of season for the

OYSTER.

table. Oysters are hermaphrodite. They produce vast numbers of young. Leuwenhoek calculated that from 3000 to 4000 exist within an O. at once when 'sack,' 'milky' or full of spawn; and according to Poli, one O. produces about 1,200,000 eggs. The eggs are hatched within the shell and mantle of the parent, and the young are to be seen swimming slowly in a whitish and mucous or creamy fluid surrounding the gills, which becomes darker and of a muddy appearance when they are about to be expelled. Each young O. is then about 1/16th of an inch in length, and about two millions are capable of being closely packed in the space of a cubic inch. When the parent O. expels the young, and this is done simultaneously by multitudes on an oyster-bank, the water becomes filled as with a thick cloud, and the spawn—called *new* by fishermen—is wafted away by currents; the greater part, of course, to be generally lost, by being driven to unsuitable situations, as exposed rocks, muddy ground, or sand to which it cannot adhere, or to be devoured by fishes and other marine animals, but some to find an object to which it can attach itself for life. The young come forth furnished with a temporary organ for swimming, ciliated, and provided with powerful muscles for extending it beyond the valves and withdrawing it at pleasure; and when the O. has become fixed in its permanent place of abode, this organ, being no longer of any use, has been supposed to drop off or gradually to dwindle away and disappear. But Dr F. Buckland has recently expressed the opinion, that the swimming organ of the young oyster is the 'lungs,' and remains as the 'lungs'

The species of O. are numerous, and are found in the seas of all warm and temperate climates. None have been found in the coldest parts of the world. The Common O. (*O. edulis*) is the only British species. Like it, the other species are generally found where the water is of no great depth; and some of them, also like it, are very abundant in estuaries, where the water is not very salt. The mangrove swamps of warm climates often abound in oysters of excellent flavour (*O. parasitica*, &c.) adhering to the roots and branches of the trees, within the reach of the tide. Some of the species differ from the Common O. not a little in form, as the LONG-HINGED O. (*O. Canadensis*) of North America, which is very elongated; and some of them far exceed it in size. Sir J. E. Tennent states that he measured the shell of an edible O. in Ceylon, and found it a little more than 11 inches in length by half as many in breadth; 'thus unexpectedly attesting the correctness of one of the stories related by the historians of Alexander's expedition, that in India they had found oysters a foot long.' Some species of O. have the valves plaited with strong longitudinal plaits.—For the illustrations here given, we are indebted to the kindness of the editor of the *Field*.

Young oysters readily attach themselves to the shells of old ones, and thus, in favourable circumstances, oyster-banks increase rapidly, so as to fill up shallow parts of the sea, and to form walls which effectually resist the waves and tides. This is very remarkably the case on the alluvial shores of Georgia and some other parts of North America, where these banks are called *Raccoon Banks*, because the racoon, among other animals, visits them to feed upon the oysters. Marshy land extends inwards from 12 to 18 miles from the sea, with tidal rivers meandering through it, and these rivers are kept pretty constant to their channels by the walls of living oysters on both sides. Large bunches of oysters may even be found among the long grass. It is not unusual for the inhabitants of the neighbourhood to light a fire, and roast a bunch of oysters on the spot. So abundant are the oysters in many places, that a vessel of 100 tons might be loaded within three times her own length. American oysters, which are of excellent flavour, are an important article of commerce in America, and have begun to be imported (alive) into Britain.

Notwithstanding the prodigious fecundity of the O., however, the beds or banks which yield it for the markets of Britain and other European countries are not sufficiently productive to satisfy the demand, and it is not so much an article of ordinary food for all classes, as a luxury of the wealthy. The usual mode of taking oysters by dredging is destructive, although, for oyster-beds, which are at all states of the tide covered with a considerable depth of water, nothing better has been devised, and the anxiety of fishermen to make the most of the present opportunity has caused many beds to be almost ruined by over-dredging. But the artificial formation of oyster-beds has been resorted to with great promise of success. It is indeed no novelty, having been practised by the Romans. Pliny says that 'the first person who formed artificial oyster-beds was Sergius Orata, who established them at Baia. . . . This was done by him, not for the gratification of gluttony, but for the sake of gain, as he contrived to make a large income by the exercise of his ingenuity.' Sergius Orata lived in the time of Augustus. Among the *vicaria* of later emperors and other wealthy Romans were *ostræria*, specially

Fig. 1.

Fig. 2.

is the mature oyster. The four figures here given represent the young oyster much magnified. Figs. 1, 3, 4 are views of the upper and under side; fig. 2 is an edge view. In very favourable situations, oysters grow rapidly, so that the Com-

Fig. 3.

Fig. 4.

mon O. is ready for the table in a year and a half or two years; but in other places, a longer time is required, often about five years.

his ingenuity.' Sergius Orata lived in the time of Augustus. Among the *vicaria* of later emperors and other wealthy Romans were *ostræria*, specially

devoted to oysters; and oyster-culture has never ceased to be practised in Italy, although to an inconsiderable extent, and particularly in Lake Fusaro, the Acheron of Virgil, a muddy salt-water pond nowhere more than two yards deep. In Britain, it has also long been practised to some extent, particularly on the coasts of Kent and Essex, for the supply of the London market. There can be no doubt, however, that this branch of industry is capable of vast development, and that many thousands of acres along the British coasts might be profitably occupied in the production of oysters, which might become, far more than hitherto, a common article of food. The subject has recently received much attention from the French government, and most successful experiments have been made, not only by the government, but also by private individuals. The shores of the Isle of Ré have within these few years been in great part converted into oyster-beds, the successful enterprise of an old soldier having led many of his neighbours to follow his example, so that now more than 3000 men are employed in oyster-culture in that island alone.

left dry by the retiring tide. In the latter kind of situations, they instinctively keep their valves closed when the water deserts them. It is in such situations that oyster-culture can be most easily and profitably carried on. Our space will not admit of details, which we would gladly give. Various methods are adopted of preparing the artificial oyster-bed, by providing suitable solid objects for the oysters to attach themselves to. Stones are piled together, and in such a way that there are many open spaces among them; stakes are driven into the mud or sand; bundles of small sticks are fastened to stones or stakes; floors of planks are formed, at a little height above the bottom, with alleys between them, the under surface of the planks being roughened by the adze; and tiles are arranged in various ways, so as to turn to account the whole space at the disposal of the oyster-cultivator as high as the ordinary tides reach. The method must be varied in accordance with the situation, and the probable violence of winds and waves; but sheltered situations are best in all respects; and experience in France seems to prove, that tiles covered with cement are preferable to

everything that has yet been tried as convenient for the cultivator, presenting a surface to which oysters readily attach themselves, and from which they can easily be removed, whilst the larger seaweeds do not grow on it so readily as on stones or wood. By the use of tiles, covered with cement, the cultivator is also able easily to remove young oysters from breeding-grounds to feeding-grounds; the best breeding-grounds being by no means those in which the oyster most rapidly attains its greatest size, and that greenish tinge which Parisian epicures so much desire to see, and which is owing to the abundant confervæ and green monads of quiet muddy waters. — It has been long known that the oysters of particular localities are finer than those produced elsewhere. Nowhere, perhaps, are finer oysters produced than on some parts of the British coasts. Those of Rutupiae, now Richborough, in Kent, were highly esteemed by the Romans, whose epicurism in oysters exceeded that of modern nations.

Of the culinary uses of oysters, it is unnecessary to say anything. Raw oysters, however, are generally believed to be more nutritious and more easily digested, as to many they are more delicious, than oysters cooked in any way; and it does not appear that any such evil consequences ever ensue from eating them as are known to ensue from eating other kinds of uncooked food. Probably no parasite capable of developing into any form injurious to the human being exists in the oyster.

The genus *Ostrea* gives its name in some zoological systems to a family *Ostreidae*. The fossil species are more numerous than the recent.

The name *O.* is popularly extended to many molluscs not included among the *Ostreidae*, as the Pearl-oyster (q. v.).

Oysters raised in artificial beds are called 'natives,' and are considered very superior to those which are dredged from the natural beds; although to these last the name of 'native' would seem more appropriate than to the other. From 30,000 to 40,000 bushels

The accompanying figure represents a piece of wood with oysters attached to it of different ages. Those marked A, are from twelve to fourteen months old, those marked B, are five or six months; those marked C, are three or four months; those marked D, are one or two months; those marked E, from fifteen to twenty days.

Oysters live equally well in situations where they are constantly under water, and in those which are

sometimes, however, an aching is complained of. The prognosis must depend upon the nature of the disease, of which the discharge is a symptom. The treatment may be divided into the general or constitutional, and the local. The *general treatment* should consist of tonics combined with alteratives, as the preparations of bark with the alkalies, or with the mineral acids; a dry, bracing air, or a temporary removal to the seaside, is also usually of service. If the discharge arises from syphilis or scurvy, the treatment suitable to those diseases should be prescribed. The *local treatment* consists in the inhalation, once or twice a day, of the steam of boiling water, to which a little creosote or carbolic acid has been added; and in more severe cases, in the thorough syringing of the nostrils, so as to wash away all collections of matter with a copious stream of warm water, to which a little chloride of zinc has been added (about 30 minims of Burnett's solution to half a pint of water).

O'ZONE (Gr. *ozo*, I smell). It was remarked long ago that a peculiar odour was produced by the working of an electrical machine. Van-Marum found that, when electric sparks were passed through a tube containing oxygen, the gas became powerfully impregnated with this odour—which he therefore called the 'smell of electricity.' Subsequent writers attributed the phenomenon to the formation of nitric acid, due to a trace of nitrogen mixed with the oxygen; especially as the gas was found to act energetically upon mercury. Thus supposed to be explained, these curious results were soon forgotten. But in 1840, Schönbein (q. v.) with remarkable acuteness, made a closer investigation of the question, and arrived at many most curious results, which have not even yet been satisfactorily accounted for. The problem remains, in fact, one of the most perplexing, as well as interesting, questions unsolved in chemistry.

The earlier results of Schönbein were as follow: (1.) When water is decomposed by the voltaic current, the electrodes being of gold or platinum, the oxygen (which appears at the positive pole) possesses in a high degree the smell and the oxidising power developed by Van-Marum by means of friction-electricity. (2.) When the positive electrode is formed of an oxidisable metal, these results are not observed, but the electrode is rapidly oxidised. (3.) The oxygen collected at a platinum electrode retains these properties for an indefinite period, if kept in a closed vessel; but loses them by heating, by the contact of an oxidisable substance, and even by contact with such bodies as charcoal and oxide of manganese. To the substance, whatever it may be, which possesses such powerful chemical affinities, Schönbein gave the name ozone, from its peculiar smell.

In 1845, he shewed that the same substance can be produced by the action of phosphorus on moist air; and suggested that it might be a higher oxide of hydrogen.

De la Rive and Marignac shortly afterwards, repeating the experiments of Van-Marum, shewed that electric sparks produce ozone even in *pure* and *dry* oxygen; and came to the conclusion, that ozone is oxygen in an *allotropic* state, as diamond is a form of coke or charcoal.

Baumert, in 1853, endeavoured to shew that there are two kinds of ozone—one formed from pure oxygen by electric sparks, which he allowed to be allotropic oxygen; the other formed in the voltaic decomposition of water, which he endeavoured to prove to be a *teroxide* of hydrogen (HO_3). But Andrews, in 1856, completely refuted this view, by shewing that no such oxide of hydrogen (at least

in a gaseous form) is produced in the electrolysis of water; and that ozone, from whatever source obtained, is the same body; and is not a compound, but an allotropic form of oxygen.

Schönbein has more recently tried to shew that whenever ozone is produced, *another* remarkable body (called antozone) is also produced; and that these are simply oxygen in different electrical states. The facts on which these ideas are founded are, however, capable of other explanations.

In 1860, Andrews and Tait published the results of a series of *volumetric* experiments on this subject, which led to some remarkable conclusions—among which are the following: When the electric discharge is passed through pure oxygen, it *contracts*. If ozone be oxygen in an allotropic form, it must therefore be denser than oxygen. It was found also that a much greater amount of contraction, and a correspondingly greater quantity of ozone, were produced by a silent discharge of electricity between fine points, than by a brilliant series of sparks. The contraction due to the formation of the ozone is entirely removed by the destruction of the ozone by heat; and this process can be repeated indefinitely on the same portion of oxygen.

In attempting to determine the density of ozone, they used various bodies to take up the ozone from the oxygen containing it; and met with many very curious results. Thus, if mercury be introduced, it is immediately attacked and oxidised, and yet the oxygen *increases* in volume. If iodine be employed, it is immediately oxidised, and *no change* of volume is observed, though the apparatus would have at once rendered visible a change to the amount of ~~weight~~ of the bulk of the oxygen. By measuring the contraction produced by electricity in the oxygen, then the effect of introducing a solution of iodide of potassium, and determining the amount of oxygen taken up from the quantity of iodine set free, Andrews and Tait shewed that the density of ozone, if it be allotropic oxygen, must be practically *infinite*—i. e., that ozone must have the density of a *liquid* or a *solid* at least, although existing in the gaseous form. This conclusion is inevitable, unless we make the very improbable assumption, that when iodine, &c., are exposed to ozone, *exactly* one half of the ozone combines with the iodine, and the other half is restored to the form of oxygen. The paper from whose statements we have quoted concludes with a suggestion that it is *possible* that, in the formation of ozone, oxygen may be decomposed. This is, of course, contrary to all the received notions of chemistry—but such a supposition would at once reconcile all the apparently contradictory facts connected with this singular body. Soret and Von Babo have recently repeated and verified a few of these results; but in spite of the wonderful sagacity of Schönbein, and the laborious experimental inquiries of many chemists, the nature of ozone is still utterly unknown.

It is not even proved that ozone exists in the atmosphere, except as the immediate result of electricity, though of late years the attention of meteorologists has been directed to the effect which it (almost invariably, and sometimes in fine weather powerfully) produced by the air on what are called ozone-test-papers—papers steeped in iodide of potassium (and generally spoiled by the addition of starch) which are rendered brown (or blue) by the liberation of iodine. No doubt, ozone, if present, would produce this effect; but there are many other substances which we *know* are generally present in the atmosphere, which are perfectly competent to produce all the effects observed. This, like the nature of ozone, is still an open question.

Epistola et Verba Mystica (a farrago of unintelligible allegory), and *Præcepta S. Pachomii*. See *Acta Sanctorum*, vol. iii.

PACHYDERMATA (Gr. thick-skins), in the system of Cuvier, an order of Mammalia, including part of the *Bruta* (Rhinceros, Elephant), and all the *Bellus* (Horse, Hippopotamus, Tapir, Hog, &c.) of Linnaeus, besides one genus (*Hyrax* or Daman) of the Linnean *Glîres*. It has been often described as less natural than any other of Cuvier's mammalian orders, as it consists of animals among which there are wide diversities, and the associating characters are rather negative than positive; but it is now universally received by naturalists as indicating a real, though not a close affinity; and when we extend our view from existing to fossil species, numerous connecting links present themselves. As defined by Cuvier, the order consists of those hoofed mammalia (*Ungulata*) which are not ruminants; all of which possess, as a more positive character, a remarkable thickness of skin. This order he divides into three sections—(1.) *Proboscidea*, having a prolonged snout or proboscis, through which the nostrils pass as elongated tubes, a powerful organ of prehension, and a delicate organ of touch, and having also five toes on each foot, enclosed in a very firm horny skin; (2.) *Ordinaria*, destitute of proboscis, although in some (Tapirs), there is such an elongation of the upper lip and nostrils as approximates to it; and the nose is employed by hogs, &c., in seeking their food, not only as an organ of smell, but as an instrument for turning up the ground, and as an organ of touch; the number of toes varies, four, three, or two on each foot; those with an even number of toes, having in the cleft foot a resemblance to the *Ruminantia*; and (3.) *Solidungula*, in which the foot has but one apparent toe, enclosed in a hoof. Some naturalists have thought it better to separate the *Solidungula* or *Equidae* (q. v.) from the P., as a distinct order; whilst others have enlarged instead of restricting the limits of the order, by adding, as a fourth section, the *Herbivorous Cetacea*.

Those P. which have a number of toes differ completely from the mammalia having claws (*Unguiculata*) in their inability to bend their toes in order to seize any object. Some of the *Edentata* have very large hoof-like claws, but this difference still subsists. The fore-limbs of the P. are also incapable of any rotatory motion, serving for support and locomotion only, not at all for prehension; the metatarsal and metacarpal bones being consolidated as in the *Ruminantia*, and they have no clavicles.

The largest terrestrial mammalia belong to this order. Most of the P. are of large size, although the damans are a remarkable exception, and some of the hog family are also comparatively small. Most of them have a clumsy form, with a slow and awkward gait; but they are capable of activity beyond what might be supposed, and sometimes move at a pretty rapid pace. Gracefulness and fleetness are characteristics of the otherwise exceptional *Solidungula*. The P. *Ordinaria* have generally great strength, and the larger ones push their way through the entangled thickets of tropical forests, bending or breaking the lianas, small trees, and branches which oppose their progress, their thick hides resisting the spines and broken branches by which the skins of other animals would be pierced. The horse and other *Solidungula* are not inhabitants of forests and jungles, but generally of grassy plains, and their hides are much less thick and hard than those of most of the *Pachydermata*.

The physiognomy of the P. in general is rather dull and unexpressive, the eyes being small, and having that character of which a familiar example

is found in the common hog. When enraged, however, they manifest their fierceness in their eyes; and although, in general, mild and gentle, they are capable of being aroused to great fury.

The skeleton of the P. *Ordinaria* and *Proboscidea* is strong and massive; the neck short, the processes of its vertebrae strongly developed; the skull affording a large surface for the muscles which support and move it.

The P. generally feed on vegetable substances. Some are omnivorous. The digestive organs are more simple than in the *Ruminantia*, but exhibit considerable diversity. The stomach is simple in some, and in others is more or less completely divided into sacs, approaching to one of the most remarkable characters of the *Ruminantia*. The intestines are generally longer than in the *Ruminantia*. The dentition exhibits considerable diversity; the adaptation to vegetable food being the most prevalent character. The most important peculiarities of the dentition and digestive organs are noticed in the articles on particular families and genera.

PACIFIC OCEAN, the largest of the five great Oceans (see OCEAN), lies between America on the east, and Asia, Malaisia, and Australasia on the west. The name 'Pacific,' given to it by Magellan, the first European navigator who traversed its wide expanse, is doubtless very appropriate to certain portions of this ocean; but, as a whole, its special claims to the epithet are at the least doubtful, though the name has by long usage become too well established to be easily supplanted by any other.

The greatest length of the P. O. from the Arctic (at Behring's Strait) to the Antarctic circles is 9200 miles, and its greatest breadth, along the parallel of latitude 5° N., about 10,300 miles; while its area may be roughly estimated at 80,000,000 English square miles, or about $\frac{1}{3}$ ths of the whole surface of the earth. Its form is rhomboidal, with one corner incomplete (at the south), and its surface is studded with numberless islands, either scattered or in groups; these, however, are chiefly confined to the western side, and to the limits of 30° N. lat. and 30° S. lat., where the depth of the ocean is not great. Along the whole eastern side, from Behring's Strait to Cape Horn, there is a belt of sea of varying width, which, with a very few exceptions, is wholly free from islands.

The coasts of the P. O. present a general resemblance to those of the Atlantic, and the similarity in the outline of the western coasts of each is even striking, especially north of the equator; but the shores of the former, unlike those of the latter, are sinuous, and, excepting the north-east coast of Asia, little indented with inlets. The shore on the American side is bold and rocky, while that of Asia varies much in character.

Though the P. O. is by far the largest of the five great oceans, being about equal to the other four in extent, the proportion of land drained into it is comparatively insignificant. Its basin includes only the narrow strip of the American continent to the west of the Andes and Rocky Mountains; Malaisia (with the exception of almost the whole of Australia), which contains few rivers, and none of them of large size; the Indo-Chinese states, China Proper, with the east part of Mongolia, and Manchuria in the Asiatic continent.

Winds.—The trade-winds of the Pacific have certain peculiarities, which have only lately been discovered. In general, they are not found to preserve their peculiar characteristics except within certain limits, thus, the south-east trades are found to blow steadily only between 92° and 140° of west longitude; while the north-east trades

PACKHORSE—PADANG.

graduated scales for philosophical instruments. It is probably never imported now, the nickel alloys of Europe having quite superseded its use; in China, however, it is still extensively employed.

PA'OKHORSE, a horse employed in the carriage of goods, which are either fastened on its back in bundles, or, if weighty, are placed in panniers, slung one on each side across the horse's back. The saddle to which the bundles were fastened consisted of two pieces of wood, curved so as to fit the horse's back, and joined together at the ends by other two straight pieces. This frame was well padded underneath, to prevent injury to the horse's back, and was firmly fastened by a girth. To each side of the saddle, a strong hook was attached, for the purpose of carrying packages, panniers, &c. Panniers were sometimes simply slung across the horse's back with



Packhorse and Panniers.

a pad under the band. The panniers were wicker baskets, and of various shapes, according to the nature of their usual contents, being sometimes long and narrow, but most generally having a length of three feet or upwards, a depth of about two-thirds of the length, and a width of from one to two feet (see fig.). The packhorse with panniers was at one time in general use for carrying merchandise, and for those agricultural operations for which the horse and cart are now employed; and in the mountainous regions of Spain and Austria, and in other parts of the world, it still forms the sole medium for transport; though the mule has, especially in Europe, been substituted for the horse.

An army requires to be accompanied by several thousand pack-animals, sometimes horses, but preferably mules; and in Asia, commonly camels, or even elephants. Pack-saddles are variously fitted, according to the objects to be carried: some for provisions or ammunition; others for carrying wounded men, tents, and, in mountain-warfare, even small cannon. In battle, the immediate reserves of small-arm ammunition are borne in the rear of divisions by pack-animals; the heavy reserves being in wagons between the army and its base of operations.

PACOURY-UVA, a sweet and delicious Brazilian fruit, a large berry, produced by the *Platonia insignis*, a tree of the natural order *Clusiaceae*. The seeds have the taste of almonds.

PACTOLUS, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the northern slope of Mount Tmolus (modern *Buz Dag*), flows north past Sardis, and empties itself into the Hermus (modern *Kodius*). It is never more than ten feet broad, and one foot deep. The sands or mud of P. were long famous in antiquity for the particles of gold dust which they contained, and which are supposed to have been carried down by

its waters from the bosom of Tmolus—a hill rich in metals. The collection of these particles, according to legend, was the source of Croesus's vast wealth. But as early even as the time of Strabo, P. had ceased to yield any of the precious dust. The brook is now called *Sarabat*.

PA'OTUM ILLI'OTUM is, in the law of Scotland, a contract or agreement for some illegal purpose, i.e., a purpose either expressly prohibited by statute, or by the general policy of the law. Thus, an immoral contract between a man and woman would be held void on the ground, that the law discountenances practices *contra bonos mores*. A contract between a client and agent, called a *pactum de quota litis*, whereby a share of the property which is the subject of litigation is given to the agent instead of his usual fees, is void in most cases; though it is often difficult to determine what contracts fall within this rule. The courts, however, have construed very jealously every contract which tends to corrupt the administration of the law, and hence an agreement between a town and country agent to divide the profits has been held a *pactum illicitum*. So agreements by a client to give an excessive sum to his law-agent as a gift have been often set aside.—In England, similar doctrines prevail, though the phrase *pactum illicitum*, which was borrowed from the Roman law, is not used, contracts of this description being technically described as illegal contracts.

PADANG, the capital of the Dutch government of the west coast of Sumatra, is situated in 1° S. lat., and 100° 22' E. long., and has about 12,000 inhabitants. The river Padang flows through the town, but is only navigable for small vessels, the larger requiring to anchor in the roadstead, about three miles distant. On the left bank, stand the houses of the natives, unsightly bamboo erections, elevated about eight feet from the ground by posts of the cocoa-nut tree, and covered with leaves. The government buildings, houses of the Europeans and Chinese, &c., are on the right, and mostly built of wood or stone, and roofed with tile. P. is picturesquely enclosed by a semicircle of mountains, behind which rises a loftier chain, two being volcanoes. There are a Protestant church, a Roman Catholic church, flourishing schools, a fort, military hospital, government workshops, large warehouses, &c. An agent of the Netherlands Trading Company (q. v.) resides at Padang. Being the centre of the exports and imports of Sumatra's west coast, P. has a lively trade, not only with Java, the other islands of the Eastern Archipelago, and Europe, but also with the interior of the island.

The climate is considered healthy, although the heat is great. Colonel Nahys found the thermometer range from 70° to 80° at 6 A.M., from 82° to 88° at noon, 84° to 90° at 2 P.M., 78° to 84° at 6 P.M., and from 72° to 80° at 10 in the evening.

The governor resides at a country-house about two and a half miles above P., and rules over a territory stretching, from the Residency of Bencoolen, which has a population of 112,000 souls, and stands immediately under the government at Batavia, north-west over seven degrees of latitude. It is divided into the residencies of Lower Padang, Upper Padang, and Tapanoei; the population, in 1858, being 1,551,251, of whom 1557 were Europeans, and 2859 Chinese.

Lower Padang was the first district of the west coast of Sumatra which submitted to the Dutch, who had formed a settlement at Padang as early as 1660, and by repeated wars, gradually extended their territory.

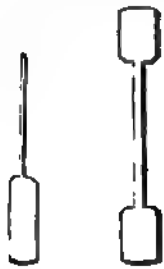
Upper Padang lies to the north-west of the lower

PADDLE—PADDLE-WHEEL.

province, from which it is separated by a chain of lofty mountains, some of which, as the Singalang, Merapi, and Sago, attain to nearly 10,000 feet in height; Merapi being an active volcano, the last eruptions of which were in 1845 and 1855, though it sent forth volumes of smoke in 1861. This residency possesses the most lovely districts of the island, or of any tropic land, the mountain slopes being studded with villages, rice-fields, cocoa-nut and coffee trees, of which last, it is calculated that there are 32,000,000 in Upper Padang. In addition to the coffee-culture, gambier, cassia, pepper, ratans, indigo, caoutchouc, &c., are largely produced, and gold, iron, copper, lead, and quicksilver are found. In the district of Tanah Datar is the town of Pagaroejong, formerly the capital of the powerful kingdom of Menangkabo, and the residence of the king.

Tapanoeli, the remaining residency under the government of Sumatra's west coast, lies north-west from Upper Padang. The independent spirit of the mind natives has caused the Netherlands much trouble, but each fresh outbreak only extends their territory and power further into the interior, and towards the north-west of the island.

PADDLE, probably the precursor of the OAR (& c.), and still its substitute among barbarous nations, is a wooden implement, consisting of a wide



Paddle. Double Paddle.

flat blade with a short handle, by means of which the operator spoons the water towards him. In canoes for only one sitter, a double paddle is generally used, which is dipped alternately on either side: the inhabitants of Greenland are especially skilful in this operation. The action of the paddle is the same as that of the oar. The paddle has, however, one advantage

—viz, that the rower faces the bow of his boat, and therefore sees what is before him. In threading narrow streams, &c., this is an appreciable gain.

PADDLE-WHEEL—one of the appliances in steam vessels by which the power of the engine is made to act upon the water and produce locomotion—is a skeleton wheel of iron, on the outer portion of whose radii flat boards, called floats or paddles, are fixed, which beat upon the water, and produce, continuously, the same effect as is given, in an intermittent manner, by the blades of oars. The use of paddle-wheels in conjunction with steam as a motive-power dates from about the commencement of the present century, but the employment of the paddle-wheel itself is as ancient as the time of the Egyptians. A specimen is also known to have been used in Spain in the 16th century.

The fig. shews the usual form of paddle-wheel, that called the radial, in which the floats are fixed. It will be seen that a certain loss of power is involved, as the full force of the engine on the water is only experienced when the float is vertical, and as on entering and leaving the water the power is mainly devoted to respectively lifting and drawing down the vessel. This objection has great force at the moment of starting, or when progress is very slow, as is illustrated by the small power a paddle-steamer evinces when trying to tug a stranded vessel off a sandbank; but when in full progress, the action is less impeded by this circumstance, the water in front of the wheel being depressed, and

that abaft being thrown into the form of a wave, so as in each case to offer a nearly vertical resistance to the float. The extent of the immersion much

Ordinary Paddle-wheel.

influences the economy of power, as when the water reaches to the centre of the wheel or above it, it is obvious that the greatest waste must take place. From this it is advantageous to give the wheel as large a diameter as possible, and to place the axis at the highest available point in the vessel.

To overcome the drawbacks to the radial wheel, Elijah Galloway patented, in 1829, the *Feathered Paddle-wheel*, in which the floats are mounted

Feathered Paddle-wheel.

on axes, and are connected by rods with a common centre, which is made to revolve eccentrically to the axis of the paddle-wheel. By this method, the floats are kept, while immersed, at right angles to the surface of the water. So long as the water is smooth, and the immersion constant, the gain is great; consequently, feathered floats are much used in river-steamers; but for ocean-steamers, the liability to derangement, perhaps at a critical period, and the variable depth of immersion, prevent them from becoming favourites.

A recent wheel, called the *Cycloidal*, has the floats divided into smaller sections, in order that the action on the water may reach the maximum of uniformity.

From various causes, the wheel slips somewhat in the water—i. e., revolves more rapidly than the ship makes way. The difference between the two speeds is called the *slip*, and amounts sometimes to one-fifth of the actual speed.

PADDY, or **PADDIE**, the name commonly applied in India to rice in the husk. It is the Tamil and the Malay name. See **RICE**.

PADELLA (Ital. a frying-pan; plur. *padelle*), a shallow vessel of metal or earthenware used in illuminations. The illumination of St Peter's at Rome, and other large buildings in Italy, is effected by the tasteful arrangement of large numbers of these little pans, which are converted into lamps by partly filling them with tallow or other grease, and placing a wick in the centre. This mode of illumination was first adopted on a large scale in Great Britain on the occasion of the marriage of the Prince of Wales with the Princess Alexandra, when the inhabitants of Edinburgh produced by this means a most magnificent illumination of their city.

PADERBORN, the chief town of a district in the Prussian province of Westphalia, situated in 51° 43' N. lat., and 8° 45' E. long., in a pleasant and fruitful district, is built at the source of the Pader, which bursts forth from below the cathedral with sufficient force to drive mills within 20 paces of its point of exit. Pop. 11,279. P. has narrow, dark, old-fashioned streets, presenting no special attractions, although it has some interesting buildings, as, for instance, the fine old cathedral, completed in 1143, with its two magnificent façades, and containing the silver coffin in which are deposited the remains of St Liborius. It is the seat of a bishop and chapter, and of an administrative court. The manufactures of P., which are not very considerable, include tobacco, starch, hats, and wax-cloths, and there are several breweries, distilleries, and sugar-refineries in the town, which carries on a considerable trade in cattle, corn, and oils. P. is one of the important stations on the Great Westphalia Railway. P., which ranked till 1803 as a free imperial bishopric, owes its foundation to Charlemagne, who nominated the first bishop in 795. Several diets were held during the middle ages at P., which at that period ranked as one of the most flourishing of the Hanseatic Cities, while it was also numbered among the Free Imperial Cities. In 1604, it was forcibly deprived by the prince-bishop, Theodor of Fürstenburg, of many of the special rights and prerogatives which it had enjoyed since its foundation, and compelled to acknowledge the Roman Catholic as the predominant church, in the place of Protestantism, which had been established during the time of Luther. In 1803, P. was, in accordance with a decree of the imperial commissioners, attached as an hereditary principality to Prussia, which had taken forcible possession of the territory of Paderborn; and after being for a time incorporated in the kingdom of Westphalia, it was restored to Prussia in 1813, and incorporated in the Westphalian circle of Minden.

PADIHAM, a rising manufacturing town in Lancashire, near the Calder, 3 miles west-north-west of Burnley, and 17 miles east-north-east of Preston. The older portion is ill-built, and has a mean appearance, but the more modern quarter contains a number of good buildings. P. is the seat of active cotton manufactures. Population of the town, within the lighting district (1861), 5675.

PADILLA, **JUAN DE**, one of the most popular heroes in Spanish history, was a scion of a Toledan family, one of the most ancient and illustrious in Spain, and was appointed by the Emperor Charles V. military commandant of Saragossa. While he was so employed, a formidable rebellion, caused by the excessive taxes which the emperor imposed on the Spaniards, to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out

among the towns (*comunidades*) of Castile, and the rebels, who were known as *comuneros*, called upon P. to put himself at their head. The introduction of the religious element into the quarrel tended greatly to strengthen the insurgents, and for an instant P. was the ruler of Spain, and formed a new junta to carry on the government. He was successful in a number of enterprises undertaken against the royalist party; but on 23d April 1521, was completely beaten by the royalists at Villalca. This conflict decided the fate of the rebellion and of P. himself, who was taken prisoner, and next day beheaded.

His wife, **DONA MARIA DE PACHECO**, rallied the wrecks of the rebel army, and for a long time held Toledo against the royalist besieging army, and after its fall, retired to Portugal, where she died soon afterwards. With P. and his wife expired the last remnant of the ancient freedom of Spain. Numerous poems and dramas celebrate their deeds.

PADISHAH, in Turkish **PADISHAH** (Persian *padi*, protector or throne, *shah*, prince), one of the titles of the Sultan of the Ottoman Empire, and of the Shah of Persia. Formerly, this title was accorded only to the kings of France among European monarchs, the others being called *Kral*, king. It was subsequently allowed to the Emperor of Austria, and still later, by a special article in the treaty of Kutahuk-Kainardji (10th January 1775), to the autocrat of All the Russias. Padishah was the title assumed by Baber and his successors on the throne of Delhi.

PADUA (Ital. *Padova*), capital of the province of the same name in Austrian Italy, stands on a beautiful plain on the Bacchiglione, 23 miles by railway west-south-west of Venice. It is surrounded by walls and ditches, and is fortified by bastions. Its houses are lofty, supported for the most part on long rows of arches, generally pointed; and most of its streets, especially in the older quarters, are narrow, dark, dirty, and ill-paved. There are, however, several handsome gates, as those of San Giovanni, Savonarolo, and Falconetto; a number of fine squares, of which the Prato della Valle is the largest and the finest, and is surrounded by a stream, and planted with trees; and several magnificent buildings. Of these, the Café Pedrocchi is esteemed the finest edifice of the kind in Italy. Portions of a Roman edifice were discovered while the foundations of this building were being made, and the marbles found now adorn the pavement, &c., of the *salone*. The Palazzo della Municipalità, built 1172—1219, is the most peculiar and most national in the city. It is an immense building, forming one side of the market-place, rests wholly on arches, and is surrounded by a loggia (q. v.). Its east end is covered with shields and armorial bearings, and its roof is said to be the largest unsupported by pillars in the world. Its hall is 267½ feet long, and 89 feet wide, is covered with mystical and metaphorical paintings, and contains a monument of Livy, the Roman historian, and a bust of Belzoni, the traveller, both natives of this city. The other chief edifices are the cathedral, the church of Sant' Antonio, a beautiful building in the Pointed style, with several Byzantine features, and remarkably rich and splendid in its internal decorations; and the churches of San Giorgio and of Santa Giustina; all of them richly decorated with paintings, sculptures, &c. The university of P., the most famous establishment in the city, was celebrated as early as the year 1221. It embraces 46 professorships, and is attended by from 1500 to 2000 students. Connected with the university are an anatomical theatre and

PAGE (derivation variously assigned to Gr. *pais*, a boy, and Lat. *pagus*, a village), a youth employed in the service of a royal or noble personage. The practice of employing youths of noble birth in personal attendance on the sovereign, existed in early times among the Persians, and was revived in the middle ages under feudal and chivalric usages. The young nobleman passed in courts and castles through the degree of page, preparatory to being admitted to the further degrees of esquire and knight. The practice of educating the higher nobility as pages at court, began to decline after the 15th c., till pages became what they are now, mere relics of feudal usages. Four pages of honour, who are personal attendants of the sovereign, form part of the state of the British court. They receive a salary of £200 a year each, and on attaining a suitable age, receive from her Majesty a commission in the Foot Guards without purchase.

PAGET, FAMILY OF. This noble family, though said to be of Norman extraction, do not trace their descent further back than the reign of Henry VII., in whose time, one William P. held the office of one of the sergeants-at-arms of the city of London. His son William, who was educated at St Paul's School, and at Cambridge, was introduced into public life by Stephen Gardiner, Bishop of Winchester, early in the reign of Henry VIII., who sent him abroad to obtain the opinions of foreign doctors as to his contemplated divorce from Catharine of Aragon. From this time forth his rise was rapid, and he was constantly employed in diplomatic missions until the death of the king, who appointed him one of his executors. He now adhered to the party of the Protector Somerset, and was raised to the peerage in 1552, as Lord Paget of Beaudesert. He shared in the power, and also in the fall, of the Protector, and was heavily fined by the Star Chamber, who also deprived him of the insignia of the Order of the Garter. His disgrace, however, was not of long continuance, and a change taking place in the councils of his opponents, he soon obtained his pardon. On the accession of Queen Mary, he was sworn a member of the privy council, and obtained several large grants of lands. He retired from public life on the accession of Elizabeth, who regarded him with much favour, though he was a strict Roman Catholic. The representative of the family adhered to the cause of Mary Queen of Scots, and suffered, in consequence, the confiscation of his property. The fifth Lord P. so far departed from the traditional policy of the family as to accept from the parliament the lord-lieutenancy of Buckinghamshire; but he returned to his allegiance shortly afterwards, and held the command of a regiment under the royal standard at the battle of Edgehill. His grandson was advanced to the earldom of Uxbridge, but this title becoming extinct, the representation of the family devolved on a female, who carried the barony of Paget by marriage into the house of Bayly. The son of this marriage, however, having assumed the name of Paget, obtained a renewal of the earldom of Uxbridge, and the second earl, for his gallantry at Waterloo, was advanced to the marquise of Anglesey. Of late years, the P. family have usually held three or four seats in every parliament, and they have constantly supported the liberal party.

PA'GING-MACHINE. Several machines have been made for paging books and numbering bank-notes, cheques, railway-tickets, and other similar papers. The great object of these machines is to prevent the chance of error or fraud by making it impossible that a page, cheque, &c. can be abstracted or lost without detection. Messrs

Waterlow and Sons of London perfected an ingenious machine, by which pages of books, such as ledgers and other commercial books, and bank-notes, &c., are numbered in regular succession. The numbers are engraved on metal rowels, usually of steel or brass. A series of these rowels are so arranged, that when the machine is worked, the numbers must be impressed on the paper in regular succession from 1 to 99,999; and it is impossible to produce a duplicate number until the whole series has been printed. The instrument is made to supply ink to the types, so that it may be locked in such a manner as to admit of being worked without the chance of its being tampered with.

An extremely ingenious modification of this machine has been perfected by M. Auguste Trouillet of Paris, under the name of 'Numérateur Mécanique,' which is not only more simple, but admits of wider application; for it not only pages books and numbers notes, tickets, &c., but can also be used for numbering bales and other packages of merchandise. The instrument has six rowels, on each of which is a set of engraved numbers, so arranged, that their revolutions produce in regular succession the required numbers, by the action of a lever which moves horizontally, and supplies the type with ink as it moves backwards and forwards.

PA'GO, an island belonging to the Austrian crownland of Dalmatia, separated from Croatia by the Moracca Canal, a channel from two to three miles in width. It is long and narrow, runs parallel to the Croatian Coast, and has an area of 84 square miles. Pop. 4910, who are most industrious, and support themselves by vine-culture, the manufacture of salt and fishing.

PAGODA (according to some, a corruption of the Sanscrit word *bhāgavata*, from *bhagavat*, sacred; but according to others, a corruption of *put-guā*, from the Persian *put*, idol, and *gada*, house) is the name of certain Hindu temples, which are amongst the most remarkable monuments of Hindu architecture. Though the word itself designates but the temple where the deity—especially Śiva, and his consort Durgā or Pārvatī—was worshipped, a pagoda is in reality an aggregate of various monuments, which, in their totality, constitute the holy place sacred to the god. Sanctuaries, porches, colonnades, gateways, walls, tanks, &c., are generally combined for this purpose, according to a plan, which is more or less uniform. Several series of walls form an enclosure; between them are alleys, habitations for the priests, &c., and the interior is occupied by the temple itself, with buildings for the pilgrims, tanks, porticos, and open colonnades. The walls have, at their openings, *gopuras*, or large pyramidal gateways, higher than themselves, and so constructed that the *gopura* of the outer wall is always higher than that of the succeeding inner wall, the pagoda itself being smaller than the smallest *gopura*. The extent of the enclosing walls is generally considerable; in most instances, they consist of hewn stones of colossal dimensions, placed upon one another without mortar or cement, but with such admirable accuracy, that their joints are scarcely visible. The gateways are pyramidal buildings of the most elaborate workmanship; they consist of several, sometimes as many as fifteen stories. The pagodas themselves, too, are of a pyramidal shape, various layers of stones having been piled upon one another in successive recession; in some pagodas, however, the pyramidal form begins only with the higher stories, the broad basis extending to about a third of the height of the whole building. The sides of the different terraces are vertical; but the transition from one to the

caused by stone in the bladder produces pain at the outlet of the urinary passage; disease of the hip-joint occasions pain in the knee, disease of the heart is often accompanied with pain in the left arm, and irritation of the stomach often gives rise to headache. Pain is differently felt by persons of different constitutions and temperaments, some persons being little sensitive to painful impressions of any kind, while others suffer greatly from slight causes. There even seem to be national differences in this respect; and before the introduction of chloroform, it was a matter of common observation that Irishmen were always more troublesome subjects for surgical operations than either Englishmen or Scotchmen; and the negro is probably less sensitive to pain than any of the white races.

Although in most cases we are to regard pain merely as a symptom to be removed only by means which remove the lesion which occasions it, there are cases in which, although it is only a symptom, it constitutes a chief element of disease, and one against which remedies must be specially directed. As examples of these cases, may be mentioned neuralgia, gastralgia, colic, dysmenorrhœa, and perforation of the intestines; and in a less degree, the stitch of pleurisy, which, if not relieved, impedes the respiration, and the pain of tenesmus, which often causes such efforts to empty the lower bowel, as seriously to disturb the functions of the intestine, and to exhaust the strength.

For the methods of relieving pain, the reader is referred to the articles on the different diseases in which it specially occurs (as COLIC, NEURALGIA, PLEURISY, &c.), and to those on CHLOROFORM, ETHER, INDIAN HEMP, MORPHIA, NARCOTICS, OPIUM, &c.

PAINE, THOMAS, an author famous for his connection with the American and French revolutions, and for his advocacy of infidel opinions, was born 29th January 1737, at Thetford, in the county of Norfolk in England. He was trained to the business of his father, who was a staymaker, but afterwards obtained a situation in the Customs, and the management of a tobacco-manufactory. His income, however, was small, and he fell into debt, and was dismissed in 1774, upon which he went to America, was favourably received by a bookseller in Philadelphia, and in 1776 published a pamphlet entitled *Common Sense*, written in a popular style, in which he maintained the cause of the colonies against the mother-country. The success and influence of this publication were extraordinary, and it won him the friendship of Washington, Franklin, and other distinguished American leaders. He was rewarded by Congress with the appointment of Secretary to the Committee of Foreign Affairs, visited France in the summer of 1787, where he made the acquaintance of Buffon, Malesherbes, La Rochefoucauld, and other eminent men; and in the autumn following, went to England, where, in 1791, he published *The Rights of Man*, the most famous of all the replies to Burke's *Reflections upon the French Revolution*. The work has gone through innumerable editions, and has been translated into almost all the languages of Europe. His defence of the principles of the French Revolution against the magnificent assault of Burke and the outcry of the English aristocracy is vigorous, and by no means unsuccessful. But the value or at least the popularity of the work has been injured by its advocacy of extreme liberal opinions. His assaults on the British constitution exposed him to a government prosecution, and he fled to France, where he was admitted to citizenship; and in 1792, the department of Pas-de-Calais elected him a deputy to the National Convention, where he voted with the Girondists. At the trial of Louis XVI., says Madame de Staël, 'Thomas Paine alone

proposed what would have done honour to France if it had been accepted—the offer to the king of an asylum in America;’ by which he offended the Mountain party; and in 1793, Robespierre caused him to be ejected from the Convention, on the ground of his being a foreigner, and thrown into prison. During his imprisonment, he wrote *The Age of Reason*, against Atheism, and against Christianity, and in favour of Deism. After an imprisonment of fourteen months, he was released, on the intercession of the American government, and restored to his seat in the Convention. He was chosen by Napoleon to introduce a popular form of government into Britain, after he should have invaded and conquered the island. But as Napoleon did not carry out his design, P. was deprived of an opportunity of playing the part of legislator for his conquered countrymen. He then retired into private life, and occupied himself with the study of finance. In 1802, he returned to the United States, and died there 8th June 1809. The most complete edition of his works is that by J. P. Mendum (Bost. 1856); the most noted of his numerous biographers is William Cobbett (1796).

PAINS AND PENALTIES. When a person has committed some crime of peculiar enormity, and for which no adequate punishment is provided by the ordinary law, the mode of proceeding is by introducing a bill of pains and penalties, the object of which, therefore, is to inflict a punishment of an extraordinary and anomalous kind. These bills are now seldom resorted to, and the last instance of an attempt to revive such a form of punishment was by the ministers of George IV. against Queen Caroline, an attempt which was signally defeated. When a bill of this kind is resolved upon, it is introduced, and passes through all the stages like any other bill in parliament, except that the party proceeded against is allowed to defend himself or herself by counsel and witnesses. The proceeding is substantially an indictment, though in form a bill.

PAINTER, in naval matters, is the rope by which a boat is fastened to a ship or pier.

PAINTERS' CREAM, a composition used by artists to cover oil-paintings in progress, when they leave off their work; it prevents drying, and the consequent shewing of lines where new work is begun. It consists of six parts of fine nut oil, and one part of gum-mastic. The mastic is dissolved in the oil, and then is added a quarter part of acetate, or sugar of lead, finely triturated with a few drops of the oil. When well incorporated with the dissolved mastic, water must be added, and thoroughly mixed, until the whole has the consistency of cream. It is applied with a soft brush, and can easily be removed with water and a sponge.

PAINTING, the art of representing objects to the eye on a flat surface by means of lines and colour, with a view to convey ideas and awaken emotions. See ART. As one of the fine arts, painting occupies a prominent place; some claim for it the first place, as combining the chief elements—namely, form, light and shade, and colour. As compared, however, with music and poetry, it lacks the important element of movement, the representation being confined, in a great measure, to one aspect and one instant of time. In its ruder and more elementary forms, in which the primary design was to communicate ideas, painting is perhaps the oldest of the arts, older, at all events, than writing (see ALPHABET, HIEROGLYPHICS); and, as a vehicle of knowledge, it possesses this advantage over writing—that no description, however minute, can convey so

to Avignon, and is said to have executed many important pictures there, and in other cities in France. The most celebrated of his frescoes now extant are those at Assisi; some noted works by him in that class also remain at Padua, Florence, and Naples. Most of the small easel-pictures ascribed to him are of doubtful authenticity, but some preserved in the gallery at Florence are acknowledged to be genuine. His high powers as a sculptor and architect are also exemplified by works in that city. Giotto had numerous scholars and imitators, and several of these have left works which shew that while they profited by his instruction or example, they were also gifted with original talent. Among these may be noticed Taddeo Gaddi, the favourite pupil of Giotto (born 1300, living in 1352); Simone Memmi (1284—1344); and Andrea Orcagna (1329—1389), one of the artists employed in the decoration of the celebrated Campo Santo at Pisa. Painting in Italy continued to be impressed with the feeling and style of Giotto for upwards of a hundred years; but early in the fifteenth century, the frescoes executed by Masaccio (1401—1443) in the Brancacci Chapel in the Carmelite Church at Florence, clearly prove that it had entered on a new phase, and had come forth strengthened by an important element in which it formerly was deficient, viz., correct delineation of form, guided by the study of nature. These celebrated frescoes, twelve in number, were at one time all ascribed to Masaccio; but it seems now to be acknowledged by judges of art that two of these are by Masolino da Panicale (1378—1415), the master of Masaccio; and three, or probably four, and a small portion of one, by Filippino Lippi (1460—1505). The frescoes by Masaccio, however, are superior to those by Masolino and Lippi, and, indeed, for many of the highest qualities in art, have, as compositions, only been surpassed by Raphael in his celebrated cartoons. In about a century from Masaccio's time, painting in Italy attained its highest development; but before referring to those artists who are acknowledged as having carried painting to the highest elevation it has attained since the period of the middle ages, it is right to note the names of some of the painters who aided in raising it to that position. The works of Fra Giovanni da Fiesole (1387—1455) are highly valued and esteemed by many critics as the purest in point of style and feeling, and so the best fitted for devotional purposes. Confining his efforts to simple and graceful action, and sweet and tender expression, he adhered to the traditional types, and ventured on none of the bold innovations which were introduced in his time, and carried so far by Masaccio. His example, as regards feeling and expression, influenced many succeeding artists, particularly Pietro Perugino, the master of Raphael (1446—1524), and Francesco Francia of Bologna (1450 or 1453—1517), by both of whom these qualities, united to greatly improved technical power, were brought to high excellence. Giovanni Bellini, the founder of the early Venetian school (1422—1512), has left many admirable works; he had numerous scholars, among them Titian and Giorgione. Domenico Corradi or Ghirlandajo, under whom Michael Angelo studied, successfully followed out that direction given to art by Masaccio, which involved individuality of character and expression in the figures. Andrea Mantegna, of the school of Padua (1430—1506), along with strong expression, gave an impetus to form, modelled on Greek or classic art. Luca Signorelli of Cortona (about 1440—1521), successfully exemplified powerful action and bold foreshortening, particularly in his frescoes at Orvieto, which, with his other works, are supposed to have strongly influenced

the style of Michael Angelo. Antonello da Messina (1447—1496) is said to have been a pupil of Jan Van Eyck, who imparted to him his secret in the preparation and use of oil-colours, the knowledge of which he spread among the Venetians. The above statement, however, as to the exact period at which oil-painting was first introduced, is one attended with much doubt. Painting with colours mixed in oil is mentioned by Italian writers before the period of Van Eyck; painting in tempore, or size, was continued in Italy, particularly in the Florentine and Roman schools, to the time of Raphael; and the transition from the one method to the other has been so gradual, that many judges of art have expressed inability to determine whether the pictures of Perugino, Francia, and Raphael are in oil or tempore, or in both. The practice of painting on canvas, in place of wooden boards or panels, was introduced and carried on for a considerable time in Venice before it was adopted in other parts of Italy, and canvas is the material best suited for pictures in oil-colours when they are not of small dimensions; so, on the whole, the conclusion seems to be, that though oil-painting was not unknown in Florence and the south of Italy, painting in tempore was longer practised there than in Venice. At the time when the painters above referred to flourished, there were many able artists in Germany, whose works are deservedly very highly prized. Among these, Jan Van Eyck (q.v.), (about 1390—1441), deserves special notice. To him is generally given the credit of being the first painter who used oil in place of size in his colours. His works are remarkable for brilliant and transparent colouring and high finish. He had numerous scholars; among these, Justus of Ghent (flor. 1451), Hugo Vander Goes (died 1480)—supposed to be the painter of the celebrated wings of an altar-piece, now at Holyrood Palace, containing portraits of James III. and his queen—Roger of Bruges (1365—1418), Hans Hemling or Memling (died 1489), the best scholar of the Van Eyck school; Quinten Matsys (1450—1529), Jan Van Mabuse (1470—1532), Albert Dürer (q.v.), (1471—1528), Lucas Van Leyden (q.v.), (1494—1533). The career of the two last-named extended to the best period of art, and for many high qualities their works strongly compete with those of the ablest of the Italians; while portraits by Hans Holbein (q.v.), (1497—1554), and Antonio More (1512—1588) rank with those of any school or period. The leading qualities in German art are invention, individuality of character, clearness of colouring, and high finish; but they are inferior to the Italians in embodying beauty; their representation of the nude is angular in form and deficient in the elegance and grace attained by the painters of Italy; and in their draperies they do not attain the simplicity and grandeur so remarkable in the works of their southern competitors.

Anything like an account of the artists by whom painting was carried to its highest pitch, of sufficient comprehensiveness to exhibit their peculiar æsthetic qualities, cannot be attempted in so short a notice as this; but that deficiency is in some degree supplied by, and reference is made to, the biographical notices of distinguished painters given in this work under their names. Keeping this reference in view, therefore, the next step is to note the relative positions generally assigned to the most distinguished painters of that period, with reference to the estimation in which their works are now held. Leonardo da Vinci (q.v.), (1452—1519), Michael Angelo Buonarroti (1474—1563), and Raphael or Raffaello Sanzio of Urbino (1483—1520), are universally acknowledged as the three greatest among the Italian artists; but two other

by the name of Eclectics, from their having endeavoured to select and unite the best qualities of each of the great masters, combined with the study of nature; the other class were distinguished by the name of Naturalisti, and they aimed at forming an independent style, distinct from that of the earlier masters, based on the indiscriminate imitation of common life, treated in a bold and lively manner. In their development, both classes exercised an influence on each other, particularly the Naturalisti on the Eclectics. Eclectic schools arose in various parts of Italy, but the most celebrated was that at Bologna, founded by Lodovico Carracci (q. v.), (1555—1619), assisted by his two nephews, Agostino Carracci (1558—1602), and Annibale Carracci (1560—1609) the most eminent of the three. Many painters of mark were reared in this school; among those, Domenico Zampieri, called Domenichino (q. v.), (1581—1641), and Guido Reni (q. v.), (1575—1642), were by far the most eminent. The art of the Eclectics has been greatly overrated. Till recently, the leaders of that school were always placed on an equality with the best masters of the early part of the 16th c., and far above any of the painters of the 15th century. These notions have recently undergone a complete change; it is now acknowledged that the attempt of the Eclectics to combine the excellences of various great masters, involves misapprehension with regard to the conception and practice of art, for the greatness of the earlier masters was brought out in their individual and peculiar qualities, the uniting of which implies a contradiction. Michael Angelo Amerighi da Caravaggio (q. v.), (1569—1609) was the founder of the Naturalisti school; he resided principally at Rome, but at a later period went to Naples, Malta, and Sicily. The Naturalisti were in their greatest strength at Naples, where they perseveringly opposed the followers of the Carracci, their leader being Giuseppe Ribera, a Spaniard, hence called Spagnoletto (q. v.), (1593—1656). With much of the force of Caravaggio, he united more delicacy and greater vivacity of colour. The historical or Scriptural subjects of Salvator Rosa (q. v.), (1615—1673) are in the style of the school of the Naturalisti; but on account of his *genre* pieces and landscapes, Salvator is entitled to occupy the place of the originator of a style noted for certain qualities of poetic feeling. The influence of the school of the Naturalisti had more important results than that of the Eclectics, for it affected to some extent the leading masters of the Spanish school. At Rome, contemporaneously with Domenichino, Guido, and other leading masters of the schools of the Eclectics and Naturalisti, the three following artists elevated landscape-painting to a high position—Nicholas Poussin (q. v.), a Frenchman (1594—1665); Claude Gellée, also a native of France (1600—1682), called Claude Lorraine (q. v.); and Gaspre Duchet, named Gaspar Poussin (q. v.), born in Rome, but the son of a Frenchman (1613—1675). Among the great masters who occasionally practised landscape-painting as a distinct branch of art, the earliest were Titian and Giorgione; the Carracci (particularly Annibale) carried out their style with considerable success; the landscapes of Domenichino are esteemed, and other scholars of the Carracci turned their attention in that direction. The reputation of N. Poussin is principally based on his figure-pictures, the subjects of which were mythological and Scriptural. Into these pictures, he endeavoured, with considerable success, to infuse the classical style; but his compositions were generally arranged with a large space of landscape background, which was in many cases not the least important portion of the picture; and these, and the pictures he painted falling strictly

under the class of landscapes, are distinguished for largeness of style and poetic feeling. Claude and Gaspar directed all their efforts to landscape, and attained to high eminence in that department of art.

The earlier specimens of painting in Spain resemble in style the works of the old German painters, who seem to have disposed of many of their pictures in that country, while Spanish art of the 16th c. was modelled on that of Italy, Titian and Raphael being the masters studied; but when works of the Spanish school are spoken of, those executed in the 17th c. are always understood to be referred to, as it was then that Spanish art became entirely national in feeling and style, and that is the period in which the best works of the school were produced. The two most distinguished Spanish painters are Don Diego Velasquez (q. v.), (1599—1660), and Bartholomé Esteban Murillo (q. v.), (1618—1682). The portraits of the former are characterised by truthful and dignified expression, great breadth and vigorous handling, and rank with the best works of that class of any school; while the Scripture subjects of the latter, which are noted for tender expression, rich colour, and powerful light and shade, may be classed with similar works by Rubens and Van Dyck. Spagnoletto, a Spanish painter, has already been referred to as a leading artist of the school of the Naturalisti at Naples. Alonzo Cano (1601—1667), Francisco Zurbaran (1598—1662), and Claudio Coello (born between 1630 and 1640—1693), have a high reputation. No name of a Spanish painter of eminence occurs after the close of the 17th century.

Very soon after the period when the Eclectic and Naturalisti schools arose in Italy, a revival of art also occurred in the Netherlands. This was very different in its effects from the revival in Italy, the only results from which were academical imitation of the older masters, and coarse naturalism, either separately or combined in varied proportions; while the works of the artists of the Netherlands executed about the same period, though they do not exhibit the high qualities found in the compositions of the Italian masters of the best period, possess many new and attractive features—freedom, originality of treatment, attention to the peculiar character of individual life, and the daily intercourse of men with each other in all its variety, and the study of nature, brought out with truth and delicacy of execution. Two important schools of art were established by this movement—the Flemish and the Dutch. The Flemish school flourished in Brabant, where the Roman Catholic faith—then making strenuous efforts to oppose the Reformed religion—still retained and actively employed art in its service. The Dutch school flourished in Protestant and republican Holland, where the artist, having to trust to private encouragement, painted, for the most part, familiar subjects from everyday life; and in place of altar-pieces for churches, produced the subjects then in demand—viz, large historical and allegorical pictures for palaces, portraits, genre pictures, or works in which life and manners are depicted in various phases—landscapes with and without figures, sea-pieces, battle-pieces, compositions representing hunting, animals, game, &c. The catalogue of the names of the able artists of these two schools is long; in the Flemish school, those who stand highest are Peter Paul Rubens (q. v.), (1577—1640), Anthony Van Dyck (q. v.), (1599—1641), David Teniers (q. v.) the Younger (1610—1690), F. Snijders (1579—1657). The following are the most eminent in the long list of artists of the Dutch school: Rembrandt (q. v.), (1608—1669), Vanderhelst (1613—1670), Albert Cuyp (q. v.), (1605—1691), Terburgh (1608—1661), A. V. Ostade

and intended to support and encourage a national school of art. The means by which the Royal Academy proposed to attain its purpose were the following: 1, by founding a school where artists may learn their profession; and 2, by instituting an exhibition where, independently of private patronage and support, artists may bring their works directly before the public. Hogarth died four years before the Royal Academy was organised; but he powerfully contributed to its establishment by his exertions in bringing the artists together in 1734, by supporting the modern exhibitions at Spring Gardens, and by ridiculing by his pencil and pen the passion of the cognoscenti of the day for crying up as superior to the modern the doubtful specimens of old art which were largely imported and disposed of at great prices in numerous salerooms established for the purpose in London. As regards technical execution, and indeed in style generally, the English artists were at first indebted to the French school, which, in the commencement of the 18th c., was in great vigour. Hogarth himself, in these respects, looked closely at the works of Watteau, engravings from which were well known in this country in his time; in deed, Watteau's pictures were so greatly admired here that he came over and spent the year 1720 painting in London. But Hogarth, though alive to the qualities in art produced by others, ranks among painters as one of the most original, for he greatly extended the dramatic element in painting, and imparted an originality and vigour to it never before attained; and his example has led to that element being one of the leading features of the English school, as is exemplified in the works of Wilkie (q. v.), Leslie (q. v.), Stuart Newton, Bonington, and others; and those of many distinguished artists of the present day. In the department of portrait-painting, many of the works of the British school rank with those of Titian, Van Dyck, and Velasquez, such, for instance, as Reynolds's portraits of Nelly O'Brien and Lady Hamilton, Gainsborough's Mrs Graham and Mrs Siddons, and some of Raeburn's heads, &c. While in that of landscape, the position of the English school is acknowledged to be very high, its influence now strongly affecting the French school—this is proved by the works of R. Wilson, Gainsborough (q. v.), and Turner (q. v.), the last of whom, for wide range of subject, and rendering of atmospheric effect, stands alone; Constable, whose powerful grasp of nature has excited the emulation of the French artists; Calcott (q. v.), Collins (q. v.), Nasmyth, J. Thomson, Muller, and others; and their successors, the artists of the day, who ably represent the English school. Animal-painting has also been elevated to a high position. And an important department, that of painting in water-colours, originated in England, and has there attained far higher excellence than in any other country.

Painting is cultivated with success and receives much encouragement in America, but there the features that mark a national school have not yet had time for development. From the close connection between Britain and America, the art of the latter country was naturally influenced by and became assimilated to that of the former. America may, however, justly take credit for having contributed in no small degree to strengthen the British school of art, as several very able members of the Royal Academy were Americans. Benjamin West (1738—1820) was one of the original members, and elected President of the Royal Academy in 1806. J. S. Copley (1737—1815), elected R.A. in 1799; his 'Death of Chatham,' and 'Defence of St Heliers, Jersey, against the French, and Death of Major

Pierson, at the moment of Victory,' are excellent works, and as such were conserved in the National Gallery, London. C. R. Leslie (1794—1859) was born in London of American parents; but in 1799, went to Philadelphia, where he was educated. Returning to London in 1811, he entered the schools of the Royal Academy; was elected academicien in 1826, and professor of painting in 1845. G. S. Newton (1794—1835)—he was admitted a student of the Royal Academy in 1821, and elected academicien in 1832. Washington Allston (1781—1843) was elected an associate in 1818; but afterwards returned to America, where he died. With the exception of the last named, the feeling evinced in the works of all these artists, influenced by study and continued residence, was essentially English; indeed few have equalled Leslie and Newton in their power of embodying the various incidents made national by English poets; and in none of their works can anything be set down as contributing in any degree to the foundation of a national American school. There is every reason to think, however, that such a school is being gradually evolved, and will soon be developed. Already something like originality of a national kind is exhibited in landscape painting, in which some American artists are endeavouring to embody scenes embracing a vast extent of country, or of extraordinary magnitude—such as those met with in the Andes, at Niagara, or exhibited by floating icebergs; and American literature, having now assumed imposing proportions, and great historical events being now in rapid progress, illustrations of American poetry and pictures of stirring national events will be called forth; and able American artists will doubtless be found to embody them and create a school truly national.

A general survey of painting at the present time exhibits the following aspect and arrangement: 1. A school in Germany, which arose during the present century, ostensibly a revival of the old national, but truly modelled on the early Italian school, the religious element being prominent. Its principal works are mural, of large dimension, and mostly executed in fresco, or on a kind of fresco lately invented, called silica or water-glass painting, from a vehicle of that kind being used. Invention, composition, grouping, and powerful and correct drawing, characterise the modern German works; but being of necessity executed from cartoons, they are deficient in that amount of individual expression, and natural colour and effect, that can only be attained by a direct and continual reference to the object represented. 2. A Belgian school, which arose in the present century, and is also a revival of the earlier national schools. Some of the Belgian artists lean to the manner of the very early Flemish school, others to that of which Rubens was the head. The greater portion of the Belgian works are easel-pictures, and many of them rank high for individual expression, colour, and technical execution. 3. A French school, exhibiting in active operation the various styles that have at different periods prevailed in that country, sometimes modified or adapted to the taste and feeling of the times. The works of the French school of the eighteenth century were utterly condemned by French artists at the close of that and commencement of the present century. They would tolerate nothing but what they called classic art. *L'École classique*, as it was styled, was in its turn supplanted by *L'École romantique*. Now, however, all styles are tolerated, even those of foreign schools—for instance, the English school of landscape—and there can be no doubt that, by the extensive range of subject, invention, drawing, and other high qualities the

and Siccatif de Harlem, a preparation imported from Paris. The mode of using the medium is of great consequence; some apply it very sparingly, others, particularly those who prefer magill, or a medium that coagulates, employ it lavishly. By the first method, firmness and decision of touch may be exhibited, by the latter, richness and brilliancy of tone; the excess tends to produce, in the one case, a hard and dry surface, and the want of the protection that varnish mixed with the colour gives against atmospheric action; the other induces a surface having a horny appearance, and a tendency to darken, or crack, or open up.

Arresting the decay of pictures, and repairing, or, as it is styled, restoring them, after they have suffered from age or bad usage are matters which engage much attention. There can be no doubt that many paintings of vast importance have been saved by the care and skill of those who have earnestly devoted themselves to that kind of work; but picture-cleaning is now a trade followed in numerous instances by ignorant pretenders and quacks, who hold out that they possess some means by which they can freshen a picture, and restore it to the state it was in when originally executed. Generally speaking, the great extent to which this business is carried on is owing to the credulity of those who dabble in collecting old pictures, one great incentive to which being the hope of picking up, or discovering, some picture of great value concealed under the dirt and discoloration acquired in a long course of years; but, nevertheless, there can be no doubt that many proprietors of works of art who collect from far higher motives, are remarkably prone to call in the picture-cleaner when his services are anything but necessary or beneficial. Sir Edwin Landseer, R.A., when examined by the Select Committee of the House of Commons appointed to inquire into certain allegations of damage by cleaning, sustained by the pictures in the National Gallery of London (Report and Evidence ordered to be printed, 1858), states, in the following terms, his idea of this rage for picture-cleaning, or rather picture-destroying: 'The first thing, whenever a picture is sold, I think, is, that it goes to a picture-restorer, or a picture-liner, or a picture-cleaner, no matter what its condition is. It is exactly the same thing as when you buy a horse; your groom says he will be all right when he has a dose of physic through him, whether he wants it or not.' The mania for picture-cleaning is not confined to this country; it is extensively carried on with even more ruinous consequences abroad, particularly in Italy, where there is a large traffic in old, and few commissions for modern works, and where in many of the public galleries one or more picture-cleaners, for whom work must be found, are attached as permanent officers.

The process of picture-cleaning, or the removal of the old varnishes or other incrustations by which a painting may be obscured, is effected either by mechanical or chemical means. The first method is accomplished when the varnish on the surface is mastic, by rubbing with the fingers the surface of varnish when in a dry state, by which action it is brought off in a fine white powder; or by scraping or erasing the surface with sharp steel instruments when the surface of the picture is tolerably smooth. The first of these processes is the best that can be employed; but when the surface is rough or unequal, the prominent portions are apt to be over-rubbed; erasing or scraping is often practised in Italy, but rarely in this country. The chemical means consist in the application of solvents, chiefly alkali, or alcohol, to dissolve the old varnish. The danger here is, that the action of these solvents is

not always stopped with sufficient promptness and dexterity, and part of the surface of the picture is taken off; consequently it is by this latter process that most destruction is caused. For the various methods employed in picture-cleaning, the Report and Minutes of Evidence, already referred to, may be consulted, and the *Guide Théorique et Pratique de l'Amateur de Tableaux, par Théodore Lejeune* (Paris, 1864), in which are stated all the most approved methods of cleaning and restoring pictures.

Works on painting and painters: Vasari (Florence, 1568); Borghini (Florence, 1584); Rodolphi (Venice, 1648); Zanetti (Venice, 1771); Lanzi (1792), Bohn's edition of Roscoe's translation; Von Rumohr (Berlin, 1827); Kugler's *Hand-book of Painting, Italian Schools of Painting*, edited by Eastlake (1855); *German, Flemish, and Dutch Schools*, by the same, edited by Sir Edmund Head, Bart. (1846); *Hand-book to Spanish Schools and French Schools* (1848); *Hand-book for Young Painters*, by C. R. Leslie, R.A. (1855).

PAINTING (House), is one of the useful arts combining much that is artistic with much that is absolutely necessary. The primary object of painting houses, or parts of them, either internally or externally, is to preserve them from decay—to cover the parts liable to suffer from exposure with a durable composition. That now used is made of ground white-lead mixed with linseed oil. This produces white paint, which forms the basis of all others. The various colours given to it are produced by the grinding of pigments (or *stainers*) along with the white-lead. The commonest of these are ochres (yellow and red earths), lampblack, Venetian red, umber, Prussian blue, chrome, vermilion, &c. Substances called driers are also mixed with the paint, such as spirits of turpentine, boiled oil, litharge and sugar of lead ground in oil. Paint may be laid on any material—stone, wood, iron, and plaster being the most usual in buildings. It has the effect of preserving these, by filling up the pores in them, and forming a coating on which the moisture of the atmosphere does not act. The paint is laid on in several coats or layers, each being allowed to dry before the next is applied. The usual number of coats for new wood or plaster varies from three to six. Five coats form a good and lasting protection from the weather. Plain painting is generally finished with a coat prepared with a mixture of oil of turpentine, which takes off the gloss from the paint, and leaves the surface quite *mat* or dead. This is called *flattening*. A very common form of decoration in all ages has been to imitate the veins or colours of marbles, and the *grains* or marks of growth of various woods. In modern times, these arts form a separate branch of house-painting, some men being *grainers*, others *marblers*, &c. The mode in which these imitations are produced is by forming a *grounding* of several coats of plain paint—usually four—and applying the colouring coat over this. In marbling, the colouring matter is marked and veined with *feathers*, in place of brushes; and in graining, steel combs are used. When the surface is dry, it is protected with one or more coats of copal varnish.

Besides painting, the decorator uses paper-hangings for adorning the walls of houses. These are applied to the walls with paste. Size-colouring is also used; the colouring matter in this case being mixed with strong Size (q. v.) in place of oil; but this has the disadvantage of being easily acted on by moisture. It is often used for the ceilings of common rooms, and for the walls of kitchens and servants' apartments, being much cheaper than oil-paint. In ancient times, in Greece and Rome, wax was used for mixing the colours with; but although

Streets; and since the introduction of an abundant supply of water from the Gleniffer Hills, is much improved in its sanitary condition.

By far the most interesting edifice is the Abbey. It was founded by Walter, the High Steward of Scotland, about 1163, for a prior and 13 monks of the Cluniac order of Reformed Benedictines, and was dedicated to St James, St Mirren, and St Milburga. It was the burying-place of the Stewarts before the accession of that family to the throne, and was occasionally used by them afterwards as a place of sepulture. It was raised to the rank of an abbey in 1245, was burned by the English in 1307, but was afterwards restored. What remains of the building is the nave, of six bays, chiefly in the First Pointed style. It is now used as the parish church, and measures 92½ feet by 35 feet. The transept is ruinous, but the north-eastern window, 25 feet high by 18 feet broad, remains. In 1862 a thorough restoration of the Abbey (at a cost of £4000) was made, the happiest feature of which was the removal of the modern and unsightly galleries. St Mirren's, or the 'Sounding Aisle,' so called from its echo, abuts upon the Abbey Church. It has a monument in the shape of a recumbent female figure resting on an altar tomb, in the attitude of prayer, supposed to commemorate Marjory Bruce, daughter of the famous King Robert.

Among the other edifices the principal are, the County Buildings, a quadrangular pile in the castellated style; the Neilson Educational Institution, a noble bequest, built in the form of a Greek cross, and surmounted by a fine dome; the Infirmary; the School of Design; and the Grammar School. This last institution was founded by King James VI., and the present building is (June 1864) just being completed.

In the beginning of the last century, the principal manufactures were coarse linens and chequered cloths. About the middle of that century, the weaving of linen and of silk gauze became the staple manufactures. In 1784 silk gauze was manufactured to the value of £350,000, and employed 5000 looms. Shawls, which used to be a principal and are still an important article of manufacture, began to be made here in the beginning of the present century. Within recent years the annual value of the shawl trade of P. was estimated at about £1,000,000 sterling. Cotton thread is manufactured on a most extensive scale; indeed P. may be considered the seat of the thread manufacture for the home and American markets. Different varieties of tartan cloths, handkerchiefs, carpets, &c. are made; soap, starch, and corn flour are largely manufactured; dyeing is carried on by several firms on an extensive scale; and a number of cotton-thread factories, power-loom factories, print works, machine shops, bleach-fields, &c. are in operation in the town and vicinity. The following is the annual value of some of the principal manufactures of P.: Paisley wove shawls, £300,000; printed shawls, black squares, silk gauzes, &c., £600,000; wineys, silk dresses, scarfs, &c., £100,000; cotton thread (which gives employment to from 3000 to 4000 people), £570,000. At the St James' Day Fair, in August, horse-races, originated by act of the bailies of the burgh in 1608, are held. Pop. (1861), 47,419.

PALACE, this title is applied, with few exceptions, in this country to houses occupied by royal personages only. In Italy the name is given to all fine dwellings.

PALACKY, FRANTIŠEK, a Bohemian philologist, critic, and historian, was born 14th June 1798 at Hodslavitz, in Moravia, and studied at Presburg

and Vienna, confining his attention chiefly to philological and historical investigations. In 1831 he was appointed by the states of Bohemia historiographer to that country, and was intrusted with the compilation of a general history of Bohemia. In furtherance of this work, he ransacked all the libraries and archives in Bohemia, and made long visits to Germany and Italy in search of materials. He took part in the political agitation of 1848, and was the leader of the Slav or national party as opposed to the German at the Diet of Kremsier, after the dissolution of which he returned to his literary labours. His great and justly celebrated work, *Geschichte von Böhmen*, 'The History of Bohemia' (Prague, 1836—1860, 8 vols. octavo), distinguished equally by profound research and vigour of style, was received on its publication with the utmost enthusiasm, though the zeal with which the writer defended the cause of the Slavic race drew down upon him the bitter comments of German critics; and the manner in which he spoke of John Huss in the 3d volume of the work greatly offended the Catholics. P. is the author of some other works of considerable merit, such as the *Theorie des Schönen*, 'The Theory of the Beautiful' (1821); *Allgemeine Geschichte der Aesthetik* (1823); *Die ältesten Denkmäler der Böhmischen Sprache*, 'The most Ancient Monuments of the Bohemian Tongue' (Prague, 1840); *Der Mongolen Einfall im Jahre 1241*, 'The Invasion of the Mongols in 1241' (Prague, 1842); and he has also edited some parts of the 'Scriptores rerum Bohemicarum' and 'Fontes rerum Austriacarum.'

PAL'ADIN, a term originally derived from the Counts Palatine, or of the Palace (see **PALATINE**), who were the highest dignitaries in the Byzantine court, and thence used generally for a lord or chieftain, and by the Italian romantic poets for a knight-errant.

PALÆASTER (Gr. ancient star-fish), a genus of star-fish peculiar to the Silurian period, which in general appearance resemble the living brittle stars, but when more minutely examined, present so many anomalies, that they cannot be referred to any existing family. Five or six species have been described.

PALÆOGRAPHY (Gr. *palaïos*, old, and *graphē*, writing), the science of ancient writings. It comprehends not merely the art of reading them, but such a critical knowledge of all their circumstances as will serve to determine their age, if they happen to be undated, and their genuineness, in the absence of any formal authentication. For these purposes, the palæographer needs to be acquainted with the various substances, such as bark, leaves, skins, paper, &c., which have been used for writing; with the various manners of writing which have prevailed, and the changes which they have undergone; with the various forms of authenticating writings, such as seals, signets, cachets, signatures, superscriptions, subscriptions, attestations, &c., which have been employed at different times; with the various phases through which the grammar, vocabulary, and orthography of the language of the writing with which he is dealing, has passed; and with more or less, as the case may be, of the history, laws, institutions, literature, and art of the age and country to which the writing professes to belong.

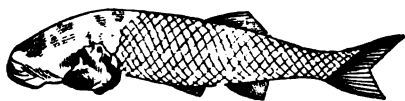
Palæography may be said to have been founded by the learned French Benedictine, Jean Mabillon, whose *De Re Diplomatica*, first published in 1681 in 1 vol. fol., reprinted in 1709, and again in 1789, in 2 vols. fol., is still, perhaps, the most masterly work on the subject. Along with the *Nouveaux Traité de Diplomatique* (Par. 1750—1765, 6 vols.

4to) of the Benedictines of St Maur, and the *Éléments de Paléographie* (Par. 1838, 2 vols. 4to) by M. Natalis de Wailly, it is the great authority for French palæography. English palæography is perhaps less favourably represented in Astle's *Origin and Progress of Writing* (Lond. 1803), than Scottish palæography in Anderson's and Ruddiman's *Diplomatica Scotica* (Edin. 1739). Muratori treats of Italian palæography in the third volume of his great work, the *Antiquitates Italicae Medii Ævi*; and among later works on the same subject may be mentioned the *Diplomatica Pontificia* (Rome, 1841) of Marino Marini. The palæography of Greece is illustrated in the *Palæographia Græca* (Par. 1708) of Montfaucon. Spanish palæography may be studied in the *Bibliotheca de la Polygraphia Espanola* (Mad. 1738) of Don C. Rodriguez. Of works on German palæography, it may be enough to name Eckard's *Introductio in Rem Diplomaticam* (Jen. 1742), Heumann's *Commentarius de Re Diplomatica* (Norimb. 1745), Walther's *Lexicon Diplomaticum* (Gott. 1745), and Kopp's *Palæographia Critica* (Manh. 1817). Hebrew palæography has been elaborated by Gesenius in his *Geschichte der Hebräischen Sprache und Schrift*, and other works. The great work on palæography generally—one of the most sumptuous works of its class ever published—is the *Palæographie Universelle* (Par. 1839—1845, in 5 vols. fol.) of M. J. B. Silvestre. See BLACK LETTER, CONTRACTIONS, PALIMPSEST, PAPYR.

PALÆOLOGUS, the name of an illustrious Byzantine family, which first appears in history about the 11th c., and attained to imperial dignity in the person of MICHAEL VIII. in 1260. This emperor successfully undertook many expeditions to Greece and the Archipelago, and used his utmost endeavours to heal the schism between the Roman and Greek Churches, though with exceedingly little success. His successor on the throne was his son ANDRONICUS II. (1282—1329), under whose reign the Turks commenced in earnest a series of assaults on the Byzantine dominions. Andronicus attempted to oppose them with a force composed of mercenaries, but his success was very doubtful, as these troops, with perfect impartiality, attacked both his enemies and his subjects. To pay them he was compelled to levy such imposts as went far to destroy Byzantine commerce. He associated his son, MICHAEL IX., with himself in the government, and was dethroned by his grandson, ANDRONICUS III. (1328—1341), an able warrior and wise ruler, who repeatedly defeated the Bulgarians, Tartars of the Golden Horde, and the Servians, and diminished the oppressive imposts of the previous reign. He was, however, unsuccessful against the Catalans in Greece, and the Turks during his reign ravaged Thrace as far as the Balkan. He was greatly esteemed by his subjects, and well merited the title of 'Father of his Country,' which they bestowed upon him. His son, JOHN VI. (1355—1391), a weak and voluptuous prince, attempted in vain both by force and bribery to stop the progress of the Turks; at last the pope, moved by his urgent entreaties, which were backed by a promise to submit the Greek Church to his (the pope's) supremacy, urged the Hungarians and Servians to arm in defence of the Greek emperor, but the result was only an additional triumph to Sultan Amurath. The feeble emperor was several times deposed, and on his final reinstatement by the sultan, acknowledged himself as his vassal for the capital and a small tract along the Propontis and Black Sea. Indeed, so degraded had the Byzantines become, that they obeyed the Sultan Bajazet's summons to aid him in attacking Philadelphia, the last Greek stronghold in Asia Minor. His son, ANDRONICUS IV. (1355—

1373), who had been associated with him in the government, died in exile. MANUEL II. (1391—1425) pursued the same tactics as his father John VI., and with the same result. The allied army of the Hungarians, Germans, and French, which he had summoned to his aid against the Turks, was totally routed at Nicopolis by Bajazet, and Constantinople itself closely besieged. The invasion of Asia Minor by Timûr, however, compelled the sultan to withdraw his whole force, and his subsequent defeat and capture at Angora in 1402, and the contests among his sons for the supremacy, gave the Greek empire a breathing space. Having aided Mohammed I. in his contests with his brothers, Manuel was, by the grateful sultan, presented with some districts in Greece, Thessalonica, and on the Euxine. JOHN VII. (1425—1449), on being pressed by the Turks, again held out to the pope the old bait of the union of the Greek and Western Churches under his sway, and even presented himself at the council of Florence, where, in July 1439, the union of the churches was agreed to. But on his return to Constantinople, the opposition of the Greek ecclesiastics to the union, supported by the people, rendered the agreement of Florence a dead letter. The pope, however, saw that it was for his interest to fulfil his part of the agreement, and accordingly stirred up Wladislas of Hungary to attack the Turks (see JAGELLONS), but this act only hastened the downfall of the Palæologi. John's brother, CONSTANTINE XIII. (1449—1453), a heroic scion of a degenerate race, accepted the crown after much hesitation, knowing his total inability to withstand the Turks, and even then took the precaution of obtaining the sultan's consent before he exercised the imperial authority; but some rebellions in Caramania which now occurred, baffling Sultan Mohammed II.'s efforts to quell them, the emperor was willingly persuaded by his rash advisers that the time had now arrived for rendering himself independent of the Turks. The attempt, however, only brought swifter destruction on the wretched remnant of the Byzantine empire, for Mohammed invested the capital by sea and land, and after a siege, which lasted from 6th April to 29th May 1453, Constantinople was taken by storm, and the last of the Palæologi fell fighting bravely in the breach. A branch of this family ruled Montferrat in Italy from 1306, but became extinct in 1533. The Palæologi were connected by marriage with the ruling families of Hungary, Servia, and the last of the family married Ivan, Czar of Russia—a fact which the Czars of Russia have persisted till lately in bringing forward as a claim in favour of their pretensions to the possession of European Turkey. It is said that direct descendants of the Palæologi exist to the present day in France. (For further information, see the separate articles on some of the emperors, and BYZANTINE EMPIRE.)

PALÆONISCUS (Gr. ancient sea-fish), a genus of ganoid fish, with a fusiform body, covered with rhomboid scales, a heterocercal tail, and moderately-sized fins, each furnished with an anterior spine.



Palæoniscus.

The single dorsal fin is opposite to the interval between the anal and ventral fins. Twenty-eight species have been described from the Carboniferous and Permian measures.

PALÆONTOLOGY (Gr. science of fossil animals) is that division of Geology (q. v.) whose province it is to inquire into the evidence of organic life on the globe during the different bygone geological periods, whether this evidence arises from the actual remains of the different plants and animals, or from recognisable records of their existence, such as footprints, Coprolites (q. v.), &c.

The metamorphic action which has so remarkably altered the oldest sedimentary rocks, is sufficient to have obliterated all traces of organic remains contained in them. Fossils are consequently extremely rare in these older palæozoic strata, and indeed it is only after long search, and within the last few months, that undoubted remains have been found in the Laurentian rocks. We were unable to record their existence in the article **LAURENTIAN SYSTEM**; but in the article **LIMESTONE**, we referred to the existence of beds of limestone as requiring the presence of animal life for their production. It is true that in 1852 an organic form resembling a coral was found in the limestone of the Ottawa, but much doubt was always entertained regarding this solitary discovery. In 1863, however, there was detected an organism in the serpentine limestone of Grenville, of true Laurentian age, which Dr Dawson describes as that of a Foraminifer, growing in large sessile patches, after the manner of *Carpentaria*, but of much greater dimensions, and presenting minute points, which reveal a structure resembling that of other foraminiferous forms, as, for example, *Calcarina* and *Nummulina*. Large portions of the limestone appear to be made up of these organisms, mixed with other fragments, which suggest comparisons with crinoids and other calcareous fossils, but which have not yet been distinctly determined. Some of the limestones are more or less coloured by carbonaceous matter, exhibiting evidences of organic structure, probably vegetable. In this single Foraminifer, and the supposed coral, we have all that is positively known of the earliest inhabitants of our globe, with which we are yet acquainted. That these are but the smallest fraction of the fauna of the period in which they lived, is evident from the undetermined fragments associated with them, as well as from the extensive deposits of limestone of the same age. And that contemporaneous with them, there existed equally numerous representatives of the vegetable kingdom, cannot be doubted, when it is remembered that the animal can obtain its food only through the vegetable, and not directly from inorganic materials. Besides, their remains apparently exist in the limestone at Grenville, a rock which, from its very nature, rarely contains vegetable fossils.

The Cambrian rocks, though of immense thickness, have hitherto yielded indications of only a very few animals, but these have a special interest, as they are the oldest fossil remains yet detected in Britain. They consist of an impression which Salter considers to be portion of a trilobite, named by him *Paleopyge*, of the burrows and tracks of sea-worms, and of two species of radiated zoophytes called *Oldhamia*—animals which in this case also can be nothing more than the most fragmentary representations of the fauna of the period. No indications of vegetable life have yet been noticed in the Cambrian rocks, for we cannot consider the superficial markings on some of these strata as having anything to do with fuel.

Undoubted representations of the four invertebrate sub-kingdoms early make their appearance in the Silurian strata, and the occurrence before the close of the period of several fish, adds to them the remaining sub-kingdom—the vertebrata. If we except the silicious frustules of Diatomaceæ which

are said to have been detected in these rocks, no satisfactory traces of plants have yet been observed, although extensive layers of anthracitic shales are common. Of the lower forms of the animal kingdom, some sponge-like bodies have been found, and corals are remarkably abundant, chiefly belonging to the order *Rugosa*, a palæozoic type, the members of which have horizontal tabulæ, and vertical plates or septa, either four in number, or a multiple of four. Graptolites, another family of zoophytes, flourished in the dark mud of the Silurian seas, and did not survive the period. All the great divisions of the Mollusca are represented by numerous genera, several of which are not very different from some living forms. A few true star-fishes have left their records on the rocks, but the most striking feature in the Echinodermata of the period is the Cystideans, or armless sea-lilies, which, like the Graptolites, did not pass beyond the Silurian seas. Tubes, tracks, and burrows of annelids have been observed; and numerous Crustacea, belonging, with the exception of one or two shrimp-like species, to the characteristic palæozoic Trilobite, of which the number of individuals is as remarkable as the variety of species and genera. It is only in the upper portion of the group (the Ludlow beds) that the fish remains have been found. These have been referred to six different genera, and are chiefly loricate ganoids, of which *Cephalaspis* is the best known.

The rocks of the Old Red Sandstone period supply the earliest satisfactory remains of plants. The Ferns, Sigillaria, Lycopodites, and Calamites, so abundant in the Coal Measures, make their appearance among the newer of these beds, and even fragments of dicotyledonous wood have been observed. The various sections of the invertebrata are well represented, but the remarkable characteristic in the animal life of the period is the abundance of strange forms of heterocercal-tailed fish, whose buckler-shields, hard scales, or bony spines occur in the greatest abundance in some beds. The reptiles and reptile tracks in the Red Sandstone of Moray, originally referred here, are now universally considered as belonging to the New Red measures.

The striking feature in the rocks of the Carboniferous period is the great abundance of plants, the remains of which occur throughout the whole series, the coal-beds being composed entirely of them, the shales being largely charged with them, the sandstones containing a few, and even the limestones not being entirely without them. These plants were specially fitted for preservation, the bulk of them being vascular cryptogams, a class which Lindley and Hutton have shewn by experiment to be capable of long preservation under water. They are chiefly ferns; some are supposed to have been arborescent lycopods, while others (*Sigillaria*, *Calamites*, and *Asterophyllites*) are so different from anything now known, that their position cannot be definitely determined, though it is most probably among the higher cryptogams. Several genera of conifers have been established from fossilised fragments of wood; and some singular impressions, which look like the flowering stems of dicotyledonous plants, have been found. The limestones are chiefly composed of crinoids, corals, and brachiopodous shells. The corals attain a great size, and the crinoids are extremely abundant, their remains making sometimes beds of limestone 1000 feet thick, and hundreds of square miles in extent. Many new genera of shells make their appearance. The trilobites, which were so abundant in the earlier rocks, are reduced to one or two genera, and finally disappear with this period. Fish with polished bony scales are found; and others, like the Port Jackson shark, with pavements of flat teeth over their mouth and gullet,

In passing upwards through the Tertiary strata, the organic remains become more and more identical with living forms, so that when we reach the Pliocene and Pleistocene periods, the great proportion of the invertebrata are the same species which are found occupying the present seas. Among the higher orders of animals, the life of a species is much shorter than in the lower, and consequently, though the vertebrata approach so nearly to existing forms as for the most part to be placed in the same genera, yet the species differ from any of the living representatives of the different genera.

The Suffolk 'Crag,' which are the only British representatives of the Pliocene period, contain the relics of a marine testacea, that differs little from the present tenants of the European seas, between 60 and 70 per cent. being the same species. The ear-bones of one or more species of Cetacea have been found, and at Antwerp, the remains of a dolphin have been discovered in beds of this age.

The various local deposits which together form the Pleistocene strata, the latest of the geological periods, contain a great variety of organic remains. In the submarine forests, and in beds of peat, the stumps of trees are associated with the remains of underwood and herbaceous plants of species still living. Nearly all the mollusca and other marine invertebrata still survive. It is among the vertebrata that the most remarkable forms appear—forms which in the main differ little from the existing race of animals except in their enormous size. Elephants and rhinoceroses, fitted for a cold climate by their covering of long coarse hair and wool, roamed over the northern regions of both the Old and the New World, and were associated with animals belonging to genera which still exist in the same region, as bears, deer, wolves, foxes, badgers, otters, wolverines, weasels, and beavers, besides others whose representatives are now found further south, as the hippopotamus, tapir, and hyena. Contemporary with these, there lived in South America a group of animals which were types in everything but in size of the peculiar existing fauna of that continent. Among these were gigantic sloth-like animals, fitted to root up and push down the trees, instead of climbing to strip them of their foliage, like the sloth. The armadillo was represented by the huge Glyptodon, whose body was protected by a strong tessellated coat of mail. The species of fossil tapirs and peccaries are more numerous than their living representatives. The lamæ were preceded by the large *Macrauchenia*, and the opossums and platyrhine monkeys were also prefigured by related species. Besides these, there have been found the remains of two mastodons and a horse, none of which are represented by any indigenous living animal in South America. The peculiar group of animals confined to Australia were prefigured by huge marsupials, some having close analogies to the living kangaroos and wombats, while others were related to the carnivorous native tiger. The gigantic wingless birds of New Zealand correspond in type with the anomalous apteryx, now existing only on these islands.

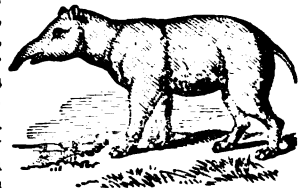
Associated with the remains of elephants, mastodons, cave-bears, and cave-hyenas, there have been found, in England and France, numerous specimens of flint implements, which are undoubtedly the result of human workmanship, and shew at least that man was contemporaneous with these extinct animals. If more certain evidence were needed of this, it has been obtained in the discovery of flint implements, bone implements fashioned and carved by means of the flint knives, the horns of a reindeer, two kinds of extinct deer, *Bos primigenius*, and other animals, associated with numerous bones

of man, included in the breccia of the cave of Bruniquel in France. Owen considers the evidence of the contemporaneity of the various remains as conclusive. The several human skulls which have been obtained shew, according to the same authority, no characters whatever indicative of an inferior or transitional type. There are no certain data to give probability to the guesses which have been made as to the number of years which have elapsed since these deposits in which the relics of man occur were formed. The whole inquiry, moreover, is so recent, and the accumulation of facts is almost every day going on, that it would be premature to speak dogmatically on the subject.

PALÆOPYGÆ (Gr. ancient rump), a genus of fossil Crustacea, founded on a single impression from the surface of a bed in the Longmynd, of Cambrian age. Salter believes it to be the cephalic shield of a trilobite, but it may be only an accidental marking. If it be the impression of an organism, it is so distorted and imperfect that little can be made of it; its peculiar interest arises from its being associated with the earliest forms of life that have been observed on the globe.

PALÆOSAURUS (Gr. ancient lizard), a genus of fossil saurian reptiles peculiar to the Permian period. The remains of two species occur in the dolomitic conglomerate at Redland, near Bristol. The teeth were more or less compressed, and were furnished with serrated cutting margins. The vertebræ were biconcave, and had a remarkable depression in the centre of each vertebra, into which the spinal canal was sunk. The leg-bones shew that the Palæosaurs were fitted for moving on the land. Owen thus exhibits their affinities: 'In their thecodont type of dentition, biconcave vertebræ, double-jointed ribs, and proportionate size of the bones of the extremities, they are allied to the *Telcosaurus*, but with these they combine a Dinosaurian femur, a lacertan form of tooth, and a crocodilian structure of pectoral and probably pelvic arch.'

PALÆOTHERIUM (Gr. ancient wild beast), a genus of pachydermatous mammalia whose remains occur in the Eocene beds of England and the continent. At least ten species have been described, ranging in size from that of a sheep to that of a horse. The upper Eocene gypseous quarries of Montmartre supplied the first scanty materials, which Cuvier, by a series of careful and in-



Palæotherium.

ductive inductions, built up into an animal, whose fidelity to nature was afterwards verified by the discovery of a complete series of fossils. In general appearance the *Palæotherium* resembled the modern tapir, and especially in having the snout terminating in a short proboscis. It had three toes on each foot, each terminated by a hoof.—The formula of the teeth is the same as that of the *Hyracotherium*, viz.,

$$I. \frac{3-3}{3-3}, C. \frac{1-1}{1-1}, P. M. \frac{4-4}{4-4}, M. \frac{3-3}{3-3} = 44;$$

but the structure of the molars approaches nearer to the molars of the rhinoceros. It is supposed that animals of this genus dwelt on the margins of lakes and rivers, and that their habits were similar to those of the tapir.

PALÆOZOIC (Gr. ancient life), the name given to the lower division of the fossiliferous

PALATE.

PALATE, THE, forms the roof of the mouth, and consists of two portions, the hard palate in front and the soft palate behind. The framework of the *hard palate* is formed by the palate process of the superior maxillary bone, and by the horizontal process of the palate bone, and is bounded in front and at the sides by the alveolar arches and gums, and posteriorly it is continuous with the soft palate. It is covered by a dense structure formed by the

wards to the side of the base of the tongue, and is formed by the projection of the palato-glossus muscle. The *posterior pillar* is larger than the anterior, and runs downwards and backwards to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the *tonsil* of either side is lodged. The tonsils (*amygdalæ*) are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an assemblage of mucous follicles, which secrete a thick grayish matter, and open on the surface of the gland by numerous (12 to 15) orifices.

The space left between the arches of the palate on the two sides is called the *isthmus of the fauces*. It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as hare-lip), so also may there be more or less decided fissure of the palate. In the slightest form of this affection, the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and hard palate as far forward as the lips, and is then often combined with hare-lip. When the fissure is considerable, it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up, its articulation is painfully indistinct. When the fissure is confined to the soft palate, repeated cauterization of the angle of the fissure has been found sufficient to effect a cure by means of the contraction that follows each burn. As a general rule, however, the child is allowed to reach the age of puberty when the operation of *staphyloraphy* (or suture of the soft parts) is performed—an operation always difficult, and not always successful. For the method of performing it, the reader is referred to the *Practical Surgery* of Mr Fergusson, who has introduced several most important modifications into the old operation.

Acute inflammation of the tonsils, popularly known as **QUINSY**, is treated of in a separate article.

Chronic enlargement of the tonsils is very frequent in scrofulous children, and is not rare in scrofulous persons of more advanced age, and may give rise to very considerable inconvenience and distress. It may occasion difficulty in swallowing, confused and inarticulate speech, deafness in various degrees from closure of the eustachian tubes (now often termed *throat deafness*), and noisy and laborious respiration, especially during sleep; and it may even cause death by suffocation, induced by the entanglement of viscid mucus between the enlarged glands. Iodide of iron (especially in the form of Blancard's Pills) and cod-liver oil are the medicines upon whose action most reliance should be placed in these cases, while a strong solution of nitrate of silver (a scruple of the salt to an ounce of distilled water), or some preparation of iodine, should be applied once a day to the affected parts. If these measures fail, the tonsils must be more or less removed by the surgeon, either by the knife or scissors, or by a small *guillotine* specially invented for the purpose.

Enlargement or relaxation of the uvula is not uncommon, and gives rise to a constant tickling cough, and to expectoration, by the irritation of the larynx which it occasions. If it will not yield to astringent or stimulating gargles, or to the stronger local applications directed for enlarged tonsils, its extremity must be seized with the forceps, and it

The Mouth widely opened so as to show the Palate :

1, 1, the upper, and 2, the lower lip; 3, 3, the hard palate; 4, 4, the soft palate; 5, the uvula; 6, 6, the arches of the soft palate; 7, 7, the tonsils; 8, the tongue.

periosteum and mucous membrane of the mouth, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucous membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with scaly epithelium, and is furnished with numerous follicles (the palatal glands). The *soft palate* is a movable fold of mucous membrane enclosing muscular fibres, and suspended from the posterior border of the hard palate so to form an incomplete septum between the mouth and the pharynx; its sides being blended with the pharynx, while its lower border is free. When occupying its usual position (that is to say, when the muscular fibres contained in it are relaxed), its anterior surface is concave; and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense, and the food is thus prevented from passing into the posterior nares, and is at the same time directed obliquely backwards and downwards into the pharynx.

Hanging from the middle of its lower border is a small conical pendulous process, the *uvula*; and passing outwards from the uvula on each side are two curved folds of mucous membrane containing muscular fibres, and called the *arches* or *pillars* of the *soft palate*. The *anterior pillar* is continued down-

who was one of the electors of the empire. See **PALATINATE**.

PALATINE HILL (*Mons Palatinus*), the central hill of the famous seven on which ancient Rome was built, and, according to tradition, the seat of the earliest Roman settlements. In point of historical interest, it ranks next to the Capitol and the Forum. Its summit is about 160 feet above the sea. The form of the hill is irregularly quadrangular. Its north-western slope, towards the Capitoline Hill and the Tiber, was called *Germalus* or *Cermalus*. The origin of the name is uncertain, although several derivations are given connecting it with legendary stories. Romulus is said to have founded the city upon this hill, and on Germalus grew the sacred fig-tree (near to the Lupercal) under which he and his brother, Remus, were found sucking the she-wolf. Upon the P. H. were the temple of Jupiter *Stator*, the temple of Cybele, the sacred square enclosure called *Roma Quadrata*, and other sacred places and edifices, besides many of the finest houses in Rome. Augustus and Tiberius had their residences here, whence Tacitus termed it *ipsa imperii arx* (the very citadel of government); and at last Nero included it entirely within the precincts of his *aurea domus*, which Vespasian subsequently restricted to the hill. From the time of Alexander Severus it ceased to be the residence of the emperors, but the name *palace* (*palatium*), derived from it, was given to the abodes of sovereigns and great princes, and has been adopted into modern languages. The ruins, or rather the rubbish of the palace, and of numerous ancient edifices, are still strewn over its surface, which is clothed with vineyards and orchards.

PALAWAN, or **PARAGOA**, one of the Philippine Islands (q. v.).

PALE, in Heraldry, one of the figures known as ordinaries, consisting of a horizontal band in the middle of the shield, of which it is said to occupy one-third (No. 1). Several charges of any kind are said to be 'in pale' when they stand over each other horizontally, as do the three lions of England. A shield divided through the middle by a horizontal line is said to be 'parted per pale.' The *Pallet* is the diminutive of the pale, and is most generally not borne singly. No. 2, Or three pallets gules, were the arms of Raymond, Count of Provence. When the field is divided into an even number of parts by perpendicular lines, it is called 'paly of' so many



pieces, as in No. 3, Paly of six argent and gules, the arms of the family of Ruthven. When divided by lines perpendicular and bendways crossing, it is called *paly bendy*, as in No. 4. An *Endorse* is a further diminutive of the pallet, and a pale placed between two endorses is said to be *endorsed* (No. 5).

PALE, in Irish history (see **IRELAND, HISTORY**), means that portion of the kingdom over which the English rule and English law was acknowledged. There is so much vagueness in the meaning of the term, that a few words of explanation appear necessary. The vagueness arises from the great fluctuations which the English authority underwent in Ireland at various periods, and from the consequent fluctuation of the actual territorial limits of the Pale. The designation dates from the reign of John, who distributed the portion of Ireland then nom-

inally subject to England into twelve counties palatine, Dublin, Meath, Kildare, Louth, Carlow, Kilkenny, Wexford, Waterford, Cork, Kerry, Tipperary, and Limerick. To this entire district, in a general way, was afterwards given the designation of the Pale. But as it may be said that the term is commonly applied by the writers of each age to the actual English territory of the period, and as this varied very much, care must be taken to allude to the age of which the name Pale is used. Thus, very soon after the important date of the Statute of Kilkenny, at the close of the reign of Edward III., the English law extended only to the four counties of Dublin, Carlow, Meath, and Louth. In the reign of Henry VI., the limits were still further restricted. In a general way, however, the Pale may be considered as comprising the counties of Dublin, Meath, Carlow, Kilkenny, and Louth. This, although not quite exact, will be sufficient for most purposes.

PA'LEA (Lat. chaff), a term employed in Botany to designate the bracts of the *florets* in Grasses (q. v.), called *corolla* by the older botanists; also to designate the small bracts or scales which are attached to the receptacle of the head of flowers in many of the *Compositæ* (q. v.). Any part of a plant covered with chaffy scales is described as *paleaceous*.

PALEMBANG, formerly an independent kingdom on the east coast of Sumatra, now a Netherlands residency, is bounded on the N. by Djambi, N.W. by Bencoolen, S. by the Lampong districts, and S.E. by the Strait of Banca, has an area of 28,140 square miles; and a population amounting, in 1860, to 378,225 souls. Much of the land is low-lying swamp, covered with a wilderness of impenetrable bush; but in the south it rises into mountains, of which Oeloe Moesi is 6180 feet in height. Gold-dust, iron-ore, sulphur with arsenic, lignite, and common coal are found; also clays suited for making coarse pottery, &c. Springs of pure oil occur near the coal-fields of Bali Boekit, and of mineral water in various places. Rice, cotton, sugar, pepper, tobacco, and, in the interior, cocoa-nuts are grown; the forests producing gutta-percha, gum-elastic, ratans, wax, benzoin, satin-wood, &c. The rivers abound with fish; and the elephant, rhinoceros, tiger, panther, and leopard roam the woods, as well as the deer, wild swine, and goats, with many varieties of the monkey.

In the dry season the thermometer ranges from 80° to 92° F., and in the rainy season, 76° to 80°; but the climate is not considered unhealthy, except in the neighbourhood of the swamps. The natives are descended from Javanese, who in the 16th c., or earlier, settled in P., and ruled over the whole land. The race, however, has become mixed with other Malays, and the language has lost its purity. In the north-west interior is a tribe called the Koeboes (Kubûs), of whose origin nothing is known, but who are probably the remainder of the aborigines. They do not follow after agriculture, go about almost naked, and live chiefly by fishing and hunting. No idea of a Supreme Being seems to be possessed by them, though they believe in existence after death.

PALEMBANG, the capital of the kingdom and residency, is 52 miles from the Soengsan, or principal mouth of the river Moesi, in 2° 59' S. lat., and 104° 44' E. long. The city is built on both banks of the Moesi, and other streams which fall into it, and is five miles in length by half a mile in breadth. The river is upwards of 1000 feet broad, and from 40 to 50 feet in depth, so that the largest vessels can sail up to the harbour. The native houses are raised on posts, and neatly constructed of planks or bamboos; the Chinese, Arabians, and Europeans, chiefly living in floating

in winter, and pleasantly tempered by sea-breezes in the hot season. Pop. (1864) 187,182.

The environs of P. are interesting as well as picturesque, and embrace many pleasant villas and noble mansions. North-west of the city is Monte Pellegrino, the Eirete of the ancients, an abrupt rocky mass, in which there is a grotto or cave, in which Santa Rosalia, a young Norman princess, lived a life of religious retirement. In P., Santa Rosalia is esteemed more highly than even Santa Maria; the festival in her honour lasts from the 9th to the 13th July, and is the most important festival held on the island. During its celebration the city is illuminated, the streets are gay and brilliant, and there is an immense influx of strangers from the vicinity. But the chief feature of the festival is the procession to the cave. An immenso silver image of the saint is borne thither on a wagon, 70 feet long, 30 feet broad, and 80 feet high. Its form resembles that of a Roman galley, with seats for a choir. The wagon is drawn by 56 mules, driven by 28 postilions covered with the gayest trappings.

P., the ancient *Panormus*, was originally a Phœnician colony, but had become a dependency of Carthage before the name occurs in history. With the exception of a short time about 276 B.C., when it fell into the hands of the Greeks, it continued to be the head-quarters of the Carthaginian power in Sicily, until it was taken by the Romans during the First Punic War (254 B.C.), when it became one of the principal naval stations of the Romans. The name Panormus is derived from the excellent anchorage (Gr. *hormos*) in the bay; but the Phœnician name found on coins is *Alchanath*, meaning 'a camp.' The Vandals, and afterwards the Arabs, made it the capital of the island, and after the Norman Conquest it continued to be the seat of the king of Sicily. It still remained the royal residence under the Aragonese kings; but the court was removed after Sicily became united to the Kingdom of Naples. See SICILY.

PALESTINE (*Palæstina*, *Philistia*), or the HOLY LAND, a country of South-Western Asia, comprising the southern portion of Syria, and bounded on the W. by the Mediterranean, E. by the valley of the Jordan, N. by the mountain-ranges of the Lebanon and the glen of the Litány (Leontes), and S. by the Desert of Sinai; lat. 31° 15'—33° 20' N., long. 34° 30'—35° 30' E. Within these narrow limits, not more than 145 miles in length by 45 in average breadth—an area less than that of the principality of Wales—is comprised the 'Land of Israel' or 'Canaan,' the arena of the greatest events in the world's history. The principal physical features of P. are, (1) a central plateau or table-land, with a mean height of 1600 feet, covered with an agglomeration of hills, which extend from the roots of the Lebanon to the southern extremity of the country; (2) the Jordan valley and its lakes; and (3) the maritime plain, and the plains of Esdraelon and Jericho. On the east, the descent from the central plateau is steep and rugged, from Lake Huleh to the Dead Sea. On the west, it is more gentle, but still well marked, towards the plains of Philistia and Sharon. The ascertained altitudes on this plateau, proceeding from south to north, are Hebron, 3029; Jerusalem, 2610; Mount of Olives, 2724; Mount Gerizim, 2700; Mount Tabor, 1900; Safed, 2775 feet above the sea. Nearly on the parallel of the Sea of Galilee, the range of Carmel extends from the central plateau north-west to the Mediterranean, where it terminates abruptly in a promontory surmounted by a convent. It rises from 600 feet in the west, to 1600 feet in the east, and is composed of a soft white limestone, with many caverns. Beyond the bound-

dary of P. on the north, but visible from the greater part of the country, Mount Hermon rises to 9381 feet, and is always snow-clad. From the formation of the central plateau, the drainage is nearly always east and west, to the Jordan and the Mediterranean. The streams of the plateau are insignificant, and generally dry in summer.

The geological formation of the country consists of jurassic and cretaceous limestone, often covered with chalk, and rich in flints, with occasional interruptions of tertiary, basaltic, and trappean deposits. The upper strata consist of limestone of a white or pale-brown colour, containing few fossils, but abounding in caverns, which form one of the peculiarities of the country. The general features of the landscape exhibit soft rounded hills, separated by narrow glens or valleys of denudation; the strata are occasionally level, but more frequently violently contorted, as seen on the route from Jerusalem to Jericho, where the fissures are often 1000 feet deep, and only 30 or 40 feet wide. Ironstone occurs in small quantities; rock-salt, asphaltum, and sulphur abound near the Dead Sea, where, as also near the Sea of Galilee, there are many hot springs. Volcanic agency is evident in the obtruded lava of former ages, and in frequent earthquakes of modern times. The vast crevasse through which the Jordan flows, and which cleaves the land from north to south, is one of the most remarkable fissures on the surface of the globe; it is from 5 to 12 miles wide, and of the extraordinary depth of 2630 feet at the bottom of the Dead Sea. Through this the river descends at the rate of 11 feet in a mile, with a course so tortuous that it travels 132 miles in a direct distance of 64, between the Sea of Galilee and the Dead Sea. It is the only perennial river of P., except the Kishon, which is permanent only in its lower course, and the Litány on its northern border. See JORDAN. The only lakes of P. are in the valley of the Jordan. See GENNESARET, SEA OF, and DEAD SEA.

The plain of Philistia extends from the coast to the first rising ground of Judah, about 15 miles in average width; the soil is a rich brown loam, almost without a stone. It is in many parts perfectly level; in others undulating, with mounds or hillocks. The towns of Gaza and Ashdod, near the sea, are surrounded by groves of olives, sycamores, and palms. This plain is still, as it always was, a vast corn-field, an ocean of wheat, without a break or fence; its marvellous fertility has produced the same succession of crops, year after year, for forty centuries without artificial aid. The plain of Sharon is about 10 miles wide in the south, narrowing towards the north, till it is terminated by the buttress of Carmel. Its undulating surface is crossed by several streams; the soil is rich, and capable of producing enormous crops; but only a small portion of it near Jaffa is cultivated, and it is rapidly being encroached on by the sea sand, which, between Jaffa and Casarea, extends to a width of 3 miles and a height of 300 feet. The famous ancient cities of this region, Casarea, Diospolis, and Antipatris, have vanished. Jaffa (Joppa) alone remains, supported by travellers and pilgrims from the west on the way to Jerusalem. The great plain of Esdraelon, or Jezreel, extends across the centre of the country from the Mediterranean to the Jordan, separating the mountain-ranges of Carmel and Samaria from those of Galilee. Its surface is drained by the Kishon, which flows west to the Mediterranean at Haifa. The plain is surrounded by the hills of Gilboa and Little Hermon; the isolated Mount Tabor rises on its north-east side. It is extremely fertile in grain where cultivated, and covered with gigantic thistles where neglected. It is richest in the

PALESTRINA, GIOVANNI PIERLUIGI DA, a distinguished musical composer of the 16th century. He derived his surname from the town of Palestrina, in the Roman States, where he was born in 1524. At the age of sixteen, he went to Rome, and studied music under Claude Goudimel, afterwards one of the victims of the St Bartholomew massacre. In 1551 he was made *maestro di capella* of the Julian Chapel, and in 1554 he published a collection of Masses, so highly approved of by Pope Julius III., to whom they were dedicated, that he appointed their author one of the singers of the pontifical chapel. Being a married man, he lost that office on the accession to the pontificate of Paul IV., in whose eyes celibacy was a necessary qualification for its duties. In 1555 he was made choir-master of St Maria Maggiore, and held that position till 1571, when he was restored to his office at St Peter's. In 1563, the council of Trent having undertaken to reform the music of the church, and condemned the profane words and music introduced into masses, some compositions of P. were pointed to as models, and their author was intrusted with the task of remodelling this part of religious worship. He composed three masses on the reformed plan; one of them, known as the Mass of Pope Marcellus (to whose memory it is dedicated), may be considered to have saved music to the church by establishing a type infinitely beyond anything that had preceded it, and, amid all the changes which music has since gone through, continues to attract admiration. During the remaining years of his life, the number and the quality of the works of P. are equally remarkable. His published works consist of 13 books of Masses, 6 books of Motets, 1 book of Lamentations, 1 book of Hymns, 1 book of Offer-tories, 1 book of Magnificats, 1 book of Litanies, 1 book of Spiritual Madrigals, and 3 books of Madrigals. P. must be considered the first musician who reconciled musical science with musical art, and his works form a most important epoch in the history of music. Equally estimable in private life, and talented as a musician, P. struggled through a life of poverty during eight pontificates; his appointments were meagre, and his publications unremunerative. He died in 1594. A memoir of his life and writings has been written by the Abbé Baini.

PALESTRO, a village of Piedmont, 8 miles south-east of Vercelli, famous as the scene of a battle between the Sardinians and Austrians in May 1859. On the 30th of that month the Piedmontese drove the Austrians from this village, and on the 31st defended it with great bravery against an Austrian attack. The Piedmontese in the battle of the 31st were assisted by 3000 French Zouaves, and on that occasion the Austrians lost 2100 men killed and wounded, 950 prisoners, and 6 pieces of cannon. On June 1st the allies entered Novara.

PALETTE. See **PAINTING**.

PALEY, DR WILLIAM, a celebrated English divine, was born at Peterborough in 1743. His father was a Yorkshireman, and not long after P. was born returned to his native parish of Giggleswick, one of the wildest and most sequestered districts in the West Riding, to become master of the grammar-school there. Young P. was brought up among the shrewd, hard-headed peasantry of Yorkshire; and it is probable that he either naturally possessed, or insensibly acquired their moral and mental characteristics. At all events, he soon became conspicuous in the family for his good sense; and when he left to enter Christ's College, Cambridge, as a sizar, in his sixteenth year, his father said: 'He has by far the clearest head I ever met with.' At Cambridge, P. led for the first

two years a gay, idle, and dissipated life, but thereafter became a severe student, and took his bachelor degree in 1763 with highest honours. He then taught for three years in an academy at Greenwich. In 1765 he obtained the first prize for a prose Latin dissertation—the subject being 'A Comparison between the Stoic and Epicurean Philosophy with respect to the Influence of each on the Morals of a People,' in which he characteristically argued in favour of the latter. Next year he was elected a Fellow and Tutor of Christ's, and also took the degree of M.A. In 1767 he was ordained a priest. His career as a college tutor, which lasted about ten years, was eminently successful; and it appears to have been during this period that he systematised his principles in moral and political philosophy. In 1776, P. married, and was of course obliged to give up his fellowship, but was compensated by a presentation to the livings of Mosgrove and Appleby in Westmoreland and of Dalston in Cumberland. Four years later he was collated to a prebendal stall in the cathedral church of Carlisle, in 1782 he became archdeacon, and in 1785 chancellor of the diocese. The last of these years witnessed the publication of his *Elements of Moral and Political Philosophy*. In this work he propounds his ethical theory, which is commonly called utilitarianism, but is really a mixture of utility and theology. He begins by renouncing the favourite doctrine of the Moral Sense, against which he adduces a series of strong objections. He then takes up the question of the source of obligation, and resolves it into the will of God, enforced by future punishment, admitting candidly that virtue is prudence directed to the next world. The will of God, in so far as it is not rendered explicit by revelation, is to be interpreted by the tendency of actions to promote human happiness; the benevolence of the Deity being supposed. Objection has frequently been taken to the principles on which P. rests his system, but the lucidity and appositeness of his illustrations are beyond all praise. If his treatise cannot be regarded as a profoundly philosophical work, it is at any rate one of the clearest and most sensible ever written, even by an Englishman; and if it failed to sound the depths of 'moral obligation,' it at least brushed off into oblivion the shallow and muddy mysticism that had long enveloped the philosophy of politics. P.'s plain sarcastic view of the 'divine right of kings,' which he puts on a level with the 'divine right of constables,' gave extreme offence to George III., but was nevertheless much admired by not a few of his majesty's subjects, and is now held by everybody to be beyond question. In 1790 appeared his most original and valuable work—the *Horæ Paulinæ, or the Truth of the Scripture History of St Paul evinced by a Comparison of the Epistles which bear his Name with the Acts of the Apostles, and with one another*. The aim of this admirable work is to prove, by a great variety of 'undesigned coincidences,' the improbability, if not impossibility, of the usual infidel hypothesis of his time—viz., that the New Testament is a 'cunningly-devised fable.' It was dedicated to his friend John Law, then Bishop of Killala in Ireland, to whose favour he had been indebted for most of his preferments. P.'s next important work was entitled *A View of the Evidences of Christianity*, published in 1794. It is not equal in originality to its predecessor, but the use which the author has made of the labours of such eminent scholars as Lardner and Bishop Douglas is generally reckoned most dexterous and effective. Later and keener criticism is indeed anything but satisfied with P.'s 'Evidences,' but in P.'s own day he was held to have achieved a splendid triumph over

written upon a second time. When the MS. had been written with one species of ink employed by the ancients, which was merely a fatty pigment, composed chiefly of lampblack, and only colouring the surface, but not producing a chemical change, there was little difficulty in obliterating the writing. It was accomplished by the use of a sponge, and, if necessary, of a scraper and polishing tool; and, where proper pains were taken, the erasure of the first writing was complete. But when the ink was mineral, its effect reached beyond the surface. In that case a scraping-tool or pumice-stone was indispensable; if these were hastily or insufficiently applied, the erasure was necessarily imperfect; and thus it often happens in ancient MSS. that, from the want of proper care on the part of the copyist in preparing the parchment for re-writing, the original writing may still be read without the slightest difficulty.

The practice of re-preparing used parchment for second use existed among the Romans. The material thus re-prepared was of course reserved for the meaner uses. We meet frequent allusions in the classical writers, as Plutarch, Cicero (*Ad Familiares*, vii. 18), Catullus (xxii. 115), and others, to the palimpsest, in the sense of a blotter or first draft-book, on which the rough outline or first copy of a document was written, preparatory to the accurate transcript which was intended for actual use; and it appears equally certain that in many cases whole books were written upon re-prepared parchment or papyrus, not only among the Greeks and Romans, but also among the ancient Egyptians.

Of palimpsests of the classic period, however, it is hardly necessary to say no specimen has ever been discovered. It is to the necessities of the mediæval period that literature owes the unquestionably important advantages which have arisen from the revival of the ancient practice of re-preparing already used material for writing. Under the early emperors, the intercourse with Egypt and the east secured a tolerably cheap and abundant supply of Papyrus (q. v.), which rendered it unnecessary to recur to the expedient of the palimpsest; and this became still more the case in the 5th and 6th centuries, when the tax on papyrus was abolished. But

after the separation of east and west, and still more after the Mohammedan conquest of Egypt, the supply of papyrus almost completely ceased; and from the 7th c. in the west, and the 10th or 11th in the east, the palimpsest is found in comparatively frequent use; and its frequency in the 15th c. may be estimated from the fact that some of the earliest books were printed on palimpsest. Some writers have ascribed the prevalence of its use to the indifference, and even to the hostility of the monks and clergy to classical literature, and have attributed to their reckless destruction of classic MSS., in order to provide material for their own service-books and legends, the deficiencies in the remains of ancient learning which scholars have now to deplore. That some part of the loss may have so arisen, it is impossible to doubt, although it is equally certain that we owe to the mediæval monks and clergy whatever of ancient literature has been preserved to our day. But the condition in which the existing palimpsests are uniformly found—for the most part mere fragments of the ancient writers whose works they originally contained—goes far in itself to show that the MSS. which were broken up by the mediæval copyists, for the purpose of being re-written, were almost always already imperfect, or otherwise damaged; nor is there anything in the condition of any single palimpsest which has reached our day to justify the belief, that when it was taken up for the purpose of rescription, the original work which it contained was in a state at all approaching to completeness. Fortunately, however, there are many of the relics of ancient learning of which even the mutilated members have an independent value; and this is especially true of Biblical MSS., particularly under the critical aspect, and in a still broader sense, of all the remains of the ancient historians.

It will easily be understood, therefore, that the chief, if not the sole interest of palimpsest MSS. lies in the ancient writing which they had contained, and that their value to literature mainly depends on the degree of legibility which the ancient writing still retains. It is difficult to make this fully intelligible to the reader without an actual inspection, but the facsimile which is annexed will furnish a sufficient idea. The particular passage

boengest quia
 et omnes xpiani membra sunt xpi
 membra xpi quid cantant. Amant
 desiderando cantant. Aliquando

selected for the illustration is from page 62 of the Vatican MS., from which Mai deciphered the fragments of the *De Republica*. The darker letters are those of the modern MS.; the faint lines are, as may be supposed, those of the original codex. Although so much more faint than the modern writing, they can be read with facility on account of their greater size. We shall transcribe both texts in ordinary characters. The original was as follows:

EST
 ISTUD INQVIT
 AFRICANUS RESP.

(The ordinary contraction for *Respublica*.)

The corresponding lines of the modern MS., which

is from St Augustine's commentary on the Psalms, are—

homo est quia
 et omnes Xpiani (Christiani) membra sunt Xpi. (Christi)
 membra Xpi. quid cantant. Amant
 Desiderando cantant. Aliquando

In this specimen, as very commonly occurs, the original writing is much larger than the modern; the modern lines and letters do not cover those of the old MS., but they follow the same order. In other specimens the new writing is transverse; in some, the old page is turned upside down. Sometimes, where the old page is divided into columns, the new writing is carried over them all in a single

ment of Latin literature, printed from a palimpsest original, is the portion of the 91st book of *Livy* already referred to, published at Hamburg and also at Rome in 1773. It was re-edited in a more complete form by Niebuhr in 1820. (2.) Of the Latin palimpsests edited by Mai, the earliest were some fragments of lost Orations of Cicero from two different palimpsests in the Ambrosian Library at Milan, in the latter of which, the second writing consisted of the acts of the council of Chalcedon. These Orations were published in two successive volumes in 1814. (3.) Eight Orations of Symmachus (1815). (4.) The Comedies of Plautus, including a fragment of the lost play entitled *Vidularia* (1815). (5.) The works of M. Corn. Fronto, together with the Epistles of Antoninus Pius, Lucius Verus, M. Aurelius, and others (1815). (6.) The celebrated Dialogue of Cicero, *De Republica*, from a palimpsest of the Vatican, the modern writing of which is the commentary of St Augustine on the Psalms. There is none of Mai's publications which presents his critical abilities in so favourable a light as this precious volume, which appeared at Rome in 1821. (7.) Soon after the *De Republica* he published another volume from palimpsest sources, the most important of whose contents were some fragments of ancient Roman law, which prepared the way for the more distinguished success of Niebuhr; who, in a palimpsest of the library of Verona, recognised a portion of (8) the *Institutiones* of Gaius, and procured an accurate transcript for the press, which was printed at Berlin in 1820. The latest considerable Latin publication in this department is (9) *Gaii Gracii Liciniani Annalium quæ supersunt* (Berlin, 1857), edited from a palimpsest of the British Museum by the younger Pertz. This palimpsest, as was already stated, is a thrice written codex, the earliest and original contents being the *Annales* of Gaius Gracius. The second writing was also in Latin, and the work is a grammatical treatise, of which the chapters *De Verbo* and *De Adverbio* are still legible. The most modern writing is Syriac, written in the cursive character. Gaius Gracius is a writer named by Macrobius, of whom nothing else is known.

It will be gathered from the above that the ancient works recovered by means of palimpsest MSS. are all fragmentary, and one is naturally led to rate at a low value the result thereby obtained. But it must be remembered that in some of the departments to which these fragments belong, every scrap, no matter how trifling, has an independent value. So it is, for example, in Biblical remains—a single text may present a valuable reading, the merest fragment may throw light on an important critical question. In history, in like manner, a small fragment may disclose an interesting fact, or supply a significant commentary upon facts otherwise ascertained. And as regards critical uses especially, it must not be forgotten that the obliterated text of the palimpsest MSS., for the most part, far exceeds in antiquity the very oldest known codices which we possess, and is, probably, second only in age to the papyri of Herculaneum.

The method of treating palimpsest MSS., with a view to deciphering their contents, has been fully described by different editors. Mai, after having washed the palimpsest with an infusion of galls, exposed it to the light and air, and, generally speaking, found this sufficient for his purpose. Peyron washed the parchment in water, afterwards in dilute muriatic acid, and finally in prussiate of potash. A mixture, compounded on this principle, is called from its inventor, M. Gioberti, *Tinctura Giobertina*. Sometimes the same treatment does not succeed equally well on both sides of the parch-

ment; the inner surface, from its softer texture, sometimes requiring a more active preparation. When the ink contained animal substances, as milk, or the blood of the cuttle-fish, Dr Mone plunged the parchment in a close vessel filled with oil, which he heated to a temperature of 400° R. In the prefaces of Mai's volumes will be found many amusing and interesting facts illustrating the difficulties which attend this curious branch of literary labour.

PALINDROME (Gr. *palin*, backwards, and *dromos*, a running), the name given to a kind of verse very common in Latin, the peculiarity of which is that it may be read the same backward as forward. A few examples will suffice.

*Si bene te tua laus taxat sua laus tenebit.
Et necat eger amor non Roma rege tacente,
Roma reges una non anus eger amor.*

A Roman lawyer gets the credit of the following:

Si nummi immunis,

which Camden translates:

'Give me my fee, and I warrant you free.'

It is said that in the reign of Queen Elizabeth a certain lady of rank, having been compelled to retire from the court on account of some *fama*, the truth of which she denied, took for her motto:

Ablata at alba.

'Retired but pure.'

The English language has few palindromes, but one at least is inimitable. It represents our first parent politely introducing himself to Eve in these words:

'Madam, I'm Adam.'

Compare Henry B. Wheatley's book on *Anagrams* (1862).

PALINGENE'SIA (Gr. *palin*, again, and *genesis*, birth) is a term that appears to have originated among the Stoics, who employed it to denote the act of the Demiurgus, or Creator, by which, having absorbed all being into himself, he reproduced it in a new creation. The occurrence of the word in the New Testament (Titus, iii. 5, where it is used to denote regeneration) has given it a place in Christian theology, and divines have variously used it to express the resurrection of men, the new birth of the individual soul, and the restoration of the world to that perfect state that it lost by the Fall—the new heavens and the new earth wherein dwelleth righteousness. Savans have also applied the term to designate both the great geological changes which the earth has undergone and the transformations in the insect kingdom, such as of caterpillars into butterflies, &c.

PALINODE, in the law of Scotland, is a peculiar practice by which, in actions for damages on account of slander or defamation raised in the Commissary Court, and even in the Sheriff Court, the pursuer may conclude not only for damages but for palinode, i. e., a solemn recantation. On a recent case, the question arose whether this ancient practice still existed as part of the law of Scotland, and it was held that it did. In actions, however, in the Court of Session, damages only are given as the remedy.

PALISADE, a paling of strong timber, used in Fortification. For the mode in which the palisade is employed see FORTIFICATION, under the head *Stockade*.

PALISANDER WOOD, the continental name for Rosewood (q. v.). By some of the French cabinet-makers the name *bois de Palisandre* is also

PALL-MALL. See MALL.

PALLADIO, ANDREA, a famous Italian architect, was born at Vicenza, 30th November 1518. After having studied with the greatest care the writings of Vitruvius, and the monuments of antiquity at Rome, he settled in his native city, and first acquired a reputation by his restoration of the Basilica of Vicenza. Pope Paul III. then invited him to Rome, designing to intrust him with the execution of the works then going on at St Peter's, but his holiness dying before the arrival of P., the latter had to return home. He was employed for many years in the construction of numerous buildings in Vicenza and the neighbourhood, in all of which he displayed the most exquisite taste combined with the most ingenious and imaginative ornamentation. His style, known as the Palladian, is a composite, and is characterised by great splendour of execution and justness of proportion, and it exercised an immense influence on the architecture of Northern Italy. His principal works are the Rotonda Capra, outside Vicenza; the Palazzo Chiericaco and the Palazzo Tiene, in the city; the Palazzo Barbara, at Maser in the Trevigiano, the Teatro Olimpico at Vicenza (his last work), the Palazzo at Montagnana for Francesco Pisana; the churches of San Giorgio Maggiore and Il Santissimo Redemptore at Venice, the atrium and cloister at the convent Della Carità, and the façade of San Francesco della Vigna in the same city. P. died at Vicenza, August 6, 1580. He wrote a work on architecture, which is highly prized. The best edition is that published at Vicenza in 4 vols., 1776.

PALLADIUM (symb. Pd, equiv. 53, specific gravity 11·8) is one of the so-called noble metals, which in its colour and ductility closely resembles platinum. It is not fusible in an ordinary wind-furnace, but melts at a somewhat lower temperature than the last-named metal; and when heated beyond its fusing-point, it volatilises in the form of a green vapour. It undergoes no change in the open air at ordinary temperatures; but at a low red heat, it becomes covered with a purple film, owing to superficial oxidation. It is soluble in nitric and iodic acids, and in aqua regia. It combines readily with gold, which it has the property of rendering brittle and white. (When it forms 20 per cent. of the mass, the alloy is perfectly white.) When alloyed with twice its weight of silver, it forms a ductile compound, which has been employed for the construction of small weights; but for this purpose aluminium is superior. Professor Miller states that it 'has been applied in a few cases to the construction of graduated scales for astronomical instruments, for which, by its whiteness, hardness, and unalterability in the air, it is well adapted;' its scarcity must, however, prevent its general use for this purpose.

It was discovered in 1803 by Wollaston in the ore of platinum, of which it seldom forms so much as 1 per cent. Another source of this metal is the native alloy which it forms with gold in certain mines in Brazil, and which is termed *ouro poudre*; and it is from this alloy that the metal is chiefly obtained.

Palladium forms with oxygen a protoxide, PdO, which is the base of the salts of the metal; a binoxide, PdO₂; and according to some chemists, a suboxide, Pd₂O. On exposure to sufficient heat, these compounds give off their oxygen, and yield the metal. The salts of the protoxide are of a brown or red colour.

PALLADIUM, among the ancient Greeks and Romans, an image of Pallas, who was generally identified with Athene, upon the careful keeping of which in a sanctuary the public welfare was believed

to depend. The Palladium of Troy is particularly celebrated. According to the current myth, it was thrown down from heaven by Zeus, and fell on the plain of Troy, where it was picked up by Ilius, the founder of that city, as a favourable omen. In the course of time, the belief spread that the loss of it would be followed by the fall of the city; it was therefore stolen by Odysseus and Diomedes. Several cities afterwards boasted of possessing it, particularly Argos and Athens. Other accounts, however, affirm that it was not stolen by the Greek chiefs, but carried to Italy by Æneas; and the Romans said that it was preserved in the temple of Vesta, but so secretly, that even the Pontifex Maximus might not behold it. All images of this name were somewhat coarsely hewn out of wood.

PALLADIUS, RUTILIUS TAURUS ÆMILLIANUS, a Roman author, who probably lived in the 4th c. A.D., under Valentinian and Theodosius. He wrote a work, *De Re Rustica* (On Agriculture), in 14 books, the last of which is a poem of 85 elegiac couplets. It is, from a literary and grammatical point of view, full of faults; but as it was a complete calendar of Roman agriculture, it was very useful for its time, and was much read and followed during the middle ages. P. has borrowed largely from his predecessors. The best edition is that by J. G. Schneider in his *Scriptores Rei Rusticæ Veteres Latini* (4 vols., Leip. 1794).

PALLAS. See MINERVA.

PALLAS, PETER SIMON, an eminent traveller and naturalist, was born, 22d September 1741, at Berlin, where his father was a physician. He studied medicine, natural history, and other branches of science, at the universities of Berlin, Göttingen, and Leyden, and was employed in classifying many valuable collections of objects of natural history, both in Holland and England. He gained a high reputation by the publication of his *Elenchus Zoophytorum* (Hague, 1766), a work still much valued; *Miscellanea Zoologica* (Hague, 1766), and *Spicilegium Zoologica* (2 vols., Berlin, 1767—1804). The Empress Catharine invited him, in 1768, to St Petersburg, where he was well received, and had honours conferred on him, and he was subsequently appointed naturalist to a scientific expedition bound for Siberia, there to observe the transit of Venus. P. spent six years on this journey (1768—1774), exploring in succession the Ural Mountains, the Kirghis Steppes, great part of the Altaian range, and the country around Lake Baikal as far as Kiachta, great part of Siberia, and the steppes of the Volga, returning to St Petersburg in 1774, with an extraordinary treasure of specimens in natural history, which form the nucleus of the Museum of the Academy of St Petersburg. His travels (*Reisen durch verschiedene Provinzen des Russ. Reichs*) were published at St Petersburg (1771—1776), in three volumes, and were followed by his *Sammlung historischer Nachrichten über die Mongol. Völkerschaften* (2 vols., St Petersburg, 1776—1802), and his *Neue nordische Beiträge zur physikalischen und geographischen Erd- und Völkerbeschreibung, Naturgeschichte und Oekonomie* (6 vols., St Petersburg, 1781—1793). Without positively neglecting any branch of natural history, he now devoted himself more particularly to botany; and his magnificent *Flora Rossica* (St Petersburg, 1784—1788), a work which, however, he was not able to complete, and his *Species Astragalorum* (14 parts, Leip. 1800—1804), were among the results of his studies. He published also *Icones Insectorum præcipue Rossicæ Sibiricæque Peculiarium* (Erlangen, 1781, 1783, and 1806); and contributed to a glossary of all the languages of the Russian empire, which was published at St Petersburg. As he wished to live

in the Crimea, the Empress Catharine presented him with an estate in the finest part of that peninsula, where he resided generally from 1796. His *Travels in the South of Russia* were published in 1799 (2 vols., Leip., with volume of plates). After the death of his wife, he went to Berlin, where he died, 8th September 1811. A large and valuable work of his, on the Fauna of Russia, has not yet (1862) been published.

PALLAVICINO, PIETRO SFORZA, an Italian historian, son of the Marquis Alessandro Pallavicino of Parma, was born at Rome, 20th November 1607. Much to the disgust of his father, he took priest's orders, and held several important ecclesiastical appointments during the pontificate of Urban VIII. In 1637, he became a member of the Jesuit Society, and was created a cardinal in 1657 by Pope Alexander VII. He died at Rome, 5th June 1667. P. was a fine scholar, and often presided in the famous Roman academy of the *Umoristi*. The best known of all his writings is his *Istoria del Concilio de Trento* (Rome, 1656—1657), intended as a reply to the still more celebrated and liberal, although, by Catholics, deeply suspected, work of Paul Sarpi. Among his other works may be mentioned *Vindicationes Soc. Jes.* (Rome, 1649); *Arte della Perfezione Cristiana—I Fasti Sacri* (the unpublished MS. is in the library of Parma); *Ermengilda*, a tragedy (Rome, 1644); *Gli Avvertimenti Grammaticali* (Rome, 1661); *Trattato dello Stilo e del Dialogo* (Rome, 1662), and *Lettere* (Rome, 1668).

PALLI, a town of Rajputana, in Judpore, stands on the right bank of a branch of the Lunj River, in lat. 23° 48' N., long. 73° 24' E. It is an entrepôt for the opium sent from Malwa to Bombay, and is the seat of extensive commerce. It imports European manufactured goods extensively, and is estimated to contain about 50,000 inhabitants.

PALLIOBRANCHIATA. See BRANCHIOPODA.

PALLIUM, the name given in the Roman Catholic Church to one of the ecclesiastical ornaments worn by the pope, by patriarchs, and by archbishops. Its use is held by Roman Catholics to descend from a very early period. It is worn by the pope at all times, as a symbol of his reputed universal and abiding jurisdiction. By archbishops it cannot be worn until it has been solemnly asked for and granted by the pope, and even then only during the solemn service of the great church festivals, and on occasions of the ordination of bishops or of priests, and other similar acts of the archiepiscopal order. The pallium is a narrow annular band of white woollen web, about three inches wide, upon which black crosses are embroidered, which encircle the neck of the archbishop, and from which two narrow bands of the same material depend, one falling over the breast, the other over the back of the wearer. Its material is the subject of much care and ceremonial. It is made wholly or in part from the wool of two lambs, which are blessed annually on the festival, and in the church of St Agnes. During the night of the vigil of the feast of St Peter and St Paul, the *pallia* made of this wool are placed on the altar above the tomb of these apostles, and on the feast of St Peter and St Paul are delivered by the pope to the subdeacon, whose duty it is to keep them in charge. Within three months of his consecration, every new archbishop is obliged to apply to the pope, in person or by proxy, for the pallium; nor is it lawful for him, until he shall have received it, to exercise any act of what is properly archiepiscopal, as contradistinguished from episcopal jurisdiction. Thus, he cannot, for example, call a provincial synod. The pallium cannot be transferred from one archbishop to another, but must be received

direct from the pope. On the archbishop's death, his pallium is interred with him. Its use is held to symbolise the office of the 'good shepherd' bearing the lost sheep on his shoulders, and is connected by some writers with the vesture of the Jewish high-priest in Exod. xxviii. 4. In the medieval church, the granting of the pallium to archbishops was one of the chief occasions of the tribute which was paid by the national churches to the support of the great central office and dignity of the papacy. In some sees, as, for instance, those of the great prince-bishops of the Rhine, the tribute was as much as 20,000 florins. Roman Catholics, however, maintain that this tribute was not a *payment* for the pallium, but an *offering* to the holy see, made on occasion of the grant of that emblem of jurisdiction.

PALM, a measure of length, originally taken from the width of the hand, measured across the joints of the four fingers. In Greece, it was known as *palaistē*, and was reckoned at 3 inches, or $\frac{1}{4}$ of a cubit, which was their standard unit. The Romans adopted two measures of this name—the one was the Greek *palaistē*, and was called *palms minor*; the other, which was not introduced till later times, was called *palms major*, or *palma*, and was taken from the length of the hand, being therefore usually estimated at three times the length of the other. At the present day, this measure varies in a most arbitrary manner, being different in each country, and occasionally varying in the same. The English palm, when used at all, which is seldom, is considered to be the fourth part of an English foot, or 3 inches. The following is a list of the most common measures to which the name palm is given:

	Value in Eng. inches.
Greek <i>palaistē</i> ,	= 3.0375
Roman <i>palmas</i> , or lesser palm,	= 2.9124
" <i>palma</i> , or greater palm,	= 3.7372
English palm ($\frac{1}{4}$ of a foot),	= 3.0000
Hamburg palm ($\frac{1}{3}$ of a foot),	= 3.7633
Amsterdam 'round' palm,	= 4.1200
" 'diameter' palm,	= 11.9687
Belgian palm, } properly the <i>decimètre</i>	= 3.9371
Lombard palm, }	
Spanish palm, or <i>palma mayor</i> ,	= 3.3450
" " or <i>palma minor</i> ,	= 2.7817
Portuguese palm, or <i>palmo de Craveira</i> ,	= 3.6616

In Germany and the Low Countries, the palm is generally confined to wood-measurement, while in Portugal it is the standard of linear measure.

PALM, JOHANN PHILIPP, a bookseller of Nuremberg, who has acquired an historic celebrity as a victim of Napoleonic justice in Germany. He was born at Schorndorf in 1766, and succeeded his father-in-law, Stein, as a bookseller in Nuremberg, the old name of the firm being retained. In the spring of 1806, a pamphlet, entitled *Deutschland in seiner tiefsten Erniedrigung* (Germany in its Deepest Humiliation), which contained some bitter truths concerning Napoleon, and concerning the conduct of the French troops in Bavaria, was sent by this firm to a bookseller in Augsburg in the ordinary course of trade, and, as P. to the last moment of his life averred, without any regard, on his part, to its contents. Napoleon's police traced it to the shop in Nuremberg, and an investigation was ordered, from which nothing resulted. Palm was in Munich, and perhaps escaped imprisonment there because his name was not the same with that of the firm; but supposing all safe, he returned to Nuremberg, and was there taken prisoner, and examined before Marshal Bernadotte, whose adjutant represented his arrestment as the consequence of direct orders from Paris. An extraordinary court-martial, held at Brunau, to which he was removed, condemned him to death, without any advocate being heard in his defence. All

intercession on his behalf was in vain. General St Hilaire declared that the orders of the emperor were positive; and the sentence was executed at two o'clock on the same day on which it was pronounced. Subscriptions were raised for the family at St Petersburg, to which the Emperor and Empress of Russia personally contributed; in England, and in several German towns, as Berlin, Leipzig, Dresden, and Hamburg. Some French writers have endeavoured to throw the blame of this murder on Marshal Berthier, instead of Napoleon.

PALM OIL. See OIL PALM.

PALM SUNDAY (Lat. *Dominica Palmarum*, or *Dom. in Palmis*), the last Sunday of Lent, is so called from the custom of blessing branches of the palm tree, or of other trees substituted in those countries in which palm cannot be procured, and of carrying the blessed branches in procession, in commemoration of the triumphal entry of our Lord into Jerusalem (John xii.). The date of the origin of this custom is uncertain. The first writer in the West who expressly refers to it is Venerable Bede. The usage certainly existed in the 7th century. A special service is found in the Roman missal, and also in the Greek euchologies, for the blessing of 'branches of palms and olives;' but in many countries, other trees, as in England, the yew or the willow, and in Brittany, the box, are blessed instead. A procession is formed, the members of which issue from the church carrying branches in their hands, and singing a hymn suited to the occasion, of very ancient origin. In the Greek Church, the book of the Gospels is borne in front. In some of the Catholic countries of the West, a priest, or, occasionally, a lay figure, was led at the head, mounted upon an ass, in commemoration of our Lord's entry into the city—a usage which still exists in Spain and in Spanish America. Before their return to the church, the doors have been closed, and certain strophes of the hymn are sung alternately by a choir within the church and by the procession without, when, on the sub-deacon's knocking at the door, it is again thrown open, and the procession re-enters. During the singing of the Passion in the solemn mass which ensues, the congregation hold the palm branch in their hands, and at the conclusion of the service it is carried home to their respective houses, where it is preserved during the year. At Rome, the Procession of the Palms, in which the pope is carried, is among the most striking of the picturesque ceremonies of the Holy Week. In England, Palm Sunday anciently was celebrated with much ceremonial; but the blessing and procession of the palms was discontinued in the Church of England, together with the other ceremonies abolished in the reign of Edward VI.

PA/LMA. See CANARIES.

PALMA, the capital of the island of Majorca (q. v.) and of the province of Baleares, is situated on the south-west coast of the island, on the Gulf of Palma, which, between Capes Figuera and Blanco, is 18 miles long, and sweeps 12 miles inland. The city is surrounded by orange plantations, and is walled and fortified. The houses, some of which are built of marble, are mostly in the Moorish style of architecture, and a number of the streets are wide and regular. It is the see of a bishop, and contains a Gothic cathedral, simple but beautiful in style, and with a spire which, from the delicate and airy character of its construction, is called the Angel's Tower. Besides other ecclesiastical edifices, the town contains an Exchange—a beautiful and ornate structure in Germano-Gothic—the governor's palace, an academy of medicine and surgery, and a large number of excellent

educational institutions, including three *colegios*. In the port, a mole, 500 yards in length, runs out from the bastions facing the south; and on each side of it are ship-building yards, for the construction of the swift lateen vessels so well known in the Mediterranean. The port is small, and only admits vessels of light draught. In 1860, 516 vessels, of 44,237 tons, entered and cleared the port. Though one of the chief marts of Europe in the 13th c., P. now carries on but little commerce. Pop. 42,910.

PA/LMA CHRISTI. See CASTOR-OIL PLANT.

PALMBLAD, VILHELM FREDRICK, a Swedish writer of considerable merit, and one of the earliest and most zealous promoters of the literature of his native country, was born in 1788 at Liljested, in East Gotland, where his father held a post under the government. While still a student at Upsala, P. purchased, in 1810, the university printing-press, and immediately entered upon the publication of several literary and scientific periodicals, which, being the first of the kind that had ever appeared in the Swedish language, attracted considerable notice, and by their intrinsic merit, contributed materially to the diffusion of general information and the creation of a taste for learning among the general Swedish public. The earliest of these were the *Phosphoros*, a mixed literary journal; the *Poetisk Kalender*, an annual; and the *Svensk Litteratur Tidsning*, a literary review, which lasted till 1824. The Swedish writers Atterbom and Hammarskjöld were associated with P. in the management of these journals, and, like him, directed all their efforts to supplant the pseudo-classical school of literature, in favour of the romantic style, and to counteract the false French taste of that period, which, under Gustavus III., had been universally followed in Swedish literature and art. P. successively occupied the chairs of History and Geography and of Greek Literature in the university of Upsala; and at his death in 1852, he left the character of having been one of the most industrious and influential Swedish writers of his day. His principal works are—*Minneftäfla öfver Sveriges Regerter* (1831); *Lärobok i nyare Historien* (Ups. 1832); *Handbok i fysiska og politiska Geographien* (1837); *Lärobok i Geographien* (Örebro, 1847); *Grekisk Formkunskab* (Ups. 1845); and in addition to these purely instructive works, among his various novels we may instance his *Familjen Falkenwärld* (Öreb. 1844); *Aurora Käningsmark* (Öreb. 1846), which rank among the best of their class in Swedish literature. P. was the editor of the great Swedish biography, *Namnkuinnige Svenska Män* (Stock. 1835–1852); and besides being an active coadjutor in the direction of the Swedish Literary Society, for which he wrote numerous papers, he was an active contributor to various German works of celebrity, as Ersch and Gruber's *Allgemeine Encyclopädie*, the *Conversations-Lexicon*, &c.

PALMELLA'CEÆ, a family or group of *Algae*, of the order or sub-order *Confervaceæ*. In organisation, they are among the lowest of plants; they are, however, universally regarded as vegetable, and do not, like the *Diatomaceæ*, occupy a somewhat doubtful position between the animal and vegetable kingdoms. The P. all grow on damp surfaces, but some under the influence of fresh water, and some of salt. Some appear as a mere powdery layer, the granules of which have little adherence to each other, as Red Snow (q. v.); some of them assume the form of a slimy film or gelatinous mass, as Gory Dew (q. v.); and some are more firm and membranous, so as to have something of the character of a frond. The P. bear so great a

resemblance to the early stages of plants higher in organisation, that doubts are entertained of their right to a distinct place in the botanical system, particularly as their mode of reproduction is not yet well understood. Conjugation has been observed in some of them. They propagate with great rapidity by gemmation, or something like it, some of them sending forth tubular filaments from their cells, the extremities of which dilate into new cells, after which the connecting tube closes, and ceases to exist; whilst in others the multiplication of cells takes place by division or segmentation (see MONAD), and the young plants exhibit remarkable powers of motion for a short time, like zoospores, being furnished with vibratile cilia, by which their motion is produced. Ere long, however, their motion ceases, and the process of segmentation is ready to begin anew. The motile organs and powers of some of the P. in the earlier part of their existence, have led to their being mistaken for animalcules.

PALMER (Lat. *palmifer*, a palm-bearer), the name of one of those numerous classes of PILGRIMS (q. v.), whose origin and history form one of the most interesting studies in the social life of medieval Europe. The Palmer, properly so called, was a pilgrim who had performed the pilgrimage to the HOLY SEPULCHRE (q. v.), and had returned, or was returning home after the fulfilment of his vow. The Palmers were so called from their carrying branches of the oriental palm, in token of their accomplished expedition. On arriving at their home, they repaired to the church to return thanks to God, and offered the palm to the priest, to be placed upon the altar. The palms so offered were frequently used in the procession of Palm Sunday. Even after the time of his return, the religious character of the Palmer still continued; and although his office might be supposed to have ceased with the fulfilment of his vow, many Palmers continued their religious peregrinations even in their native country. They were thus a class of itinerant monks, without a fixed residence, professing voluntary poverty, observing celibacy, and visiting at stated times the most remarkable SANCTUARIES (q. v.) of the several countries of the West. Their costume was commonly the same as that of the ordinary PILGRIM (q. v.), although modified in different countries.

PALMERSTON, VISCOUNT, HENRY JOHN TEMPLE, an English politician, was born at the family mansion, Broadlands, near Romsey, Hants, October 20, 1784. The Temples are of Saxon origin, and the family claim descent from Edwyn, who was deprived of the earldom of Mercia by the Conqueror, and lost his life in defending himself against the Normans in 1071. Sir W. Temple, the diplomatist and patron of Swift, was a member of this family, which removed to Ireland in the time of Elizabeth. The family was ennobled 1722, when Henry Temple was created a peer of Ireland with the dignities of Baron Temple and Viscount Palmerston. His grandson, the second viscount, father of the present peer, superintended his son's education at Broadlands, and then sent him to Harrow. P. afterwards went to the university of Edinburgh, where he attended the lectures of Dugald Stewart and other professors. He next matriculated at St John's College, Cambridge, whence he was summoned to attend the deathbed of his father, on whose decease, in 1805, P. succeeded to the title. His eminent abilities were early recognised, for he was scarcely of age when the Tory party in the university selected him (1806) as their candidate to succeed Mr Pitt in the representation. The late Marquis

of Lansdowne was the Whig candidate; and Lord Byron, then at Cambridge, in his *Hours of Idleness*, evinces the interest he took in the election. P. was unsuccessful, and again in 1807. He entered parliament, however, in the same year for the borough of Newport, his colleague being Arthur Wellesley, then chief secretary of Ireland. In 1811, he exchanged Newport for the university of Cambridge, enjoyed the distinction of representing his *alma mater* for 20 years, and only lost his seat when he became a member of the Grey administration, and supported the Reform Bill. For the last two years of the unreformed parliament, he sat for the now extinct borough of Bletchingly. At the first election after the Reform Act, he was returned for South Hampshire, but lost his seat at the general election of 1835. He immediately afterwards found a seat for the borough of Tiverton, which he has promised never to leave as long as the electors will permit him to represent them. Having traced his representative, we now turn to his official career. P. entered life as a member of the Tory party, and accepted the office of Secretary at War in the Duke of Portland's administration in 1809. This office he held during the successive governments of Mr Perceval, the Earl of Liverpool, Mr Canning, Lord Goderich, and the Duke of Wellington—a period extending from 1809 to 1828. There was ample scope at the War-office for P.'s administrative talents and activity. Our military system swarmed with abuses, and the labour thrown upon the Secretary at War during the Peninsular campaigns was prodigious. In 1817, an attempt was made to assassinate P. by an insane army-lieutenant, named Davis, who fired a pistol at him as he was entering the Horse Guards, the bullet, however, only inflicting a slight wound. P. early attached himself to the Canning section of the Liverpool administration, and he accepted a seat in the cabinet of Mr Canning. His official connection with the Tory party ceased in 1828, when the 'Great Duke' insisted on accepting Mr Huskisson's resignation, which was followed by P.'s retirement. The Duke's government was swept away in the reform flood of 1830; and Earl Grey, who became Prime Minister, offered the seals of the Foreign Office to Palmerston. The European horizon was so disturbed at this crisis, that a great political authority declared that if an angel from heaven were in the Foreign Office, he could not preserve peace for three months. P. falsified the prediction. Louis Philippe then filled the throne of France; and for the first time on record, England and France acted in concert, and without jealousy, under P.'s foreign ministry. He took a leading part in effecting the independence of Belgium, and in establishing the thrones of Queen Isabella of Spain and Queen Maria of Portugal on a constitutional basis. In 1841, P. went out of office with the Whigs on the question of free trade in corn; but on their return in 1846, he resumed the seals of the Foreign Office. His second foreign administration furnished various subjects of hostile party criticism, among which may be mentioned the civil war in Switzerland, the Spanish marriages, the European revolutions in 1848, the rupture of diplomatic relations between Spain and Great Britain, and finally, the affair of Don Pacifico and the quarrel with Greece. A vote of censure on the foreign policy of the government was, in 1850, carried in the House of Lords on the motion of Lord Stanley (afterwards Earl of Derby). A counter-resolution, approving the foreign policy of the government, was thereupon moved by Mr Roebuck in the Lower House. The debate lasted four nights. In a speech of five hours' duration—'that speech,' said Sir Robert Peel, 'which made us

all so proud of him'—P. entered upon a manly and dignified vindication of his foreign policy; and Mr Roebuck's motion was carried by a majority of 46. In December 1851, the public were startled at the news that P. was no longer a member of the Russell cabinet. He had expressed his approbation of the *coup d'état* of Louis Napoleon, without consulting either the premier or the Queen; and as explanations were refused, her Majesty exercised her constitutional right of dismissing her minister. P. avenged himself, as soon as parliament met, by shattering the Russell administration to pieces on a comparatively trifling question regarding the militia. He refused an offer from the Earl of Derby to join the government which he was commissioned to form, but accepted the post of Home Secretary in the coalition administration of the Earl of Aberdeen in 1852. The fall of this government, on Mr Roebuck's motion for a Sebastopol committee, placed P. in his 71st year in the position of prime minister, to which he was unanimously called by the voice of the nation. He vigorously prosecuted the Russian war until Sebastopol was taken, and peace was made. His government was defeated in March 1857, on Mr Cobden's motion, condemnatory of the Chinese war. Parliament was dissolved, and P. met the House of Commons with a large majority. But his administration fell in February 1858, upon the Conspiracy Bill, intended to protect the French emperor against the machinations of plotting refugees. A short Conservative administration followed; but in June 1859, P. was again called to the post of First Lord of the Treasury, which he has continued to fill to the present moment (June 1864). It has been his ambition to be considered the minister of a nation rather than the minister of a political party; and his opponents have been constrained to admit that he has held office with more general acceptance than any English minister since the time of the great Lord Chatham. As an orator, he is usually homely and unpretending, but always sensible and practical. He is a dexterous tactician, and a ready, witty, and often brilliant debater. He is popular as a minister, because he is thoroughly English in his ends and aims. Even his robust health, manly bearing, and physical vigour, are elements of his popularity, because they are regarded as a glorification of the English sports, which he has never been ashamed to patronise. He desires nothing so ardently as to promote the wealth and grandeur of Great Britain, and his national character and national spirit are thoroughly appreciated by his countrymen. He married, in 1839, the widow of the fifth Earl of Cowper, daughter of the first Viscount Melbourne. As he is without issue, and his only brother, the Honourable W. Temple, many years British minister at Naples, died unmarried, the title becomes extinct on his decease.

PALMER-WORM, a name given to many large kinds of grub, the larvae of coleopterous insects, destructive to vegetable substances of various kinds. It is used in the English version of the Old Testament as the translation of the Hebrew *gazam*, rendered *kumpe* by the Septuagint, which modern Hebrew writers and others very generally regard as a kind of locust, although more probably it is either the grub of a coleopterous or the caterpillar of a lepidopterous insect.—See Kitto in *Pictorial Bible*, on Joel i. 4.

Palmer-fishes are much used by anglers on the English streams, and are at certain seasons excellent lures for trout, &c.

PALMETTO (*Sabal palmetto*, or *Chamærops palmetto*), a species of palm, a native of maritime parts of North America, as far north as lat. 35°;

which is further north than any other American species of palm is found. It attains a height of 40—50 feet, and has a crown of large palmated leaves, the blade from one foot to five feet in length and breadth, and the footstalk long. The flowers are small, greenish, and in long racemes; the fruit black, about as long as a pea-pod, and uneatable. The leaves are made into hats. The terminal bud or *cabbage* is eaten. The wood is extremely porous: but is preferred to every other kind of wood in North America for wharfs, as it is very durable, and not liable to be attacked by worms.—The *Chamærops* (q. v.) *humilis* of the south of Europe is also called Palmetto.

PALMETTO-LEAVES, the leaves of the Palmyra (q. v.) palm, *Borassus flabelliformis*, which grows extensively in India and Polynesia. The leaves have great value as a material for the manufacture of hats, mats, &c., and for this purpose are frequently imported into Europe. In their native country, they are used as thatch, and for a great variety of other useful applications.

PALMI'PEDÉS, or **WEB-FOOTED BIRDS**, also called **NATATORES**, or **SWIMMERS**, an order of birds, the *Anseres* of Linnaeus, very natural and universally recognised by ornithologists, having the feet specially formed for swimming, and the toes *webbed*, i. e., connected by a membrane, at least those which are directed forwards. In swimming, the feet are contracted when drawn forwards, the toes being brought together, and expanded to their utmost extent in the backward stroke. In accordance with their aquatic habits, the P. are further characterised by a boat-like form, calculated to move through the water with little resistance; and by a dense and polished plumage, oiled by a secretion from certain glands near the tail, very impervious to water; whilst warmth is further secured by a clothing of down, more or less abundant, beneath the feathers. They are remarkable for the length of the breast-bone (*sternum*), and the neck is often longer than the legs, a thing very unusual in birds, so that they can plunge the head far down in search of food. The length of the wings differs very much in different sections of the order, and with it the power of flying; as does also the power of diving, which some possess in a high degree, and others, even of the same family, in a very inferior degree. To this order belong geese, swans, ducks, divers, grebes, auks, guillemots, puffins, penguins, petrels, albatrosses, gulls, terns, shearwaters, noddies, pelicans, cormorants, frigate-birds, gannets, darters, tropic-birds, &c.

PALMITIC ACID ($\text{HO}, \text{C}_{15}, \text{H}_{31}, \text{O}_2$) is one of the most important of the *Fatty Acids*, represented by the general formula $\text{HO}, \text{C}_n, \text{H}_{2n+1}, \text{O}_2$ (see **OILS AND FATS**). In a pure state, when crystallised from alcohol, it occurs in the form of beautifully white acicular crystals arranged in tuft-like groups. These crystals are devoid of odour or taste, communicate a fatty feeling to the finger, fuse at 143°-6, and solidify on cooling in the form of crystalline scales. This acid is lighter than water, in which it is perfectly insoluble; but it dissolves freely in boiling alcohol and in ether, and the solutions have a distinctly acid reaction. In small quantities it may be distilled without decomposing, if the heat be carefully regulated. The neutral palmitates of the alkalies constitute soaps, and are soluble in water; if, however, their solutions are largely diluted with additional water, they are decomposed, an insoluble acid salt being precipitated, while a portion of the base remains in solution. The addition of chloride of sodium (common salt) to a solution of an alkaline palmitate produces a similar

supply of all their wants. The fruit of some species is eaten; sometimes the fleshy part of the fruit, sometimes the kernel of the nut. The importance of the date and the cocoa-nut needs only to be alluded to; but in this respect they far excel the fruits of all other palms. A grateful beverage is made from the fruit of some P. (see ASSA), consisting simply of a mixture of the pulp with water; but a kind of wine can be obtained also by fermentation (see DATE). A kind of beverage more generally used is the sap of palm-trees, either fresh or fermented (*palm-wine* or *toddy*), from which also a kind of spirits called Arrack (q. v.) is obtained by distillation; whilst from the fresh sap, boiled down, sugar is obtained—the *jaggery* of the East Indies. The sap of various species of palm is collected and used for these purposes, and that of many others is probably not less suitable. The pulp of the fruit of some species, and the kernel of others, yield bland fixed oil useful for various purposes. See OIL PALM and COCOA-NUT. The soft and starchy centre of the stem of some P. affords a very important and abundant article of food. See SAGO. The terminal bud, or *cabbage*, of some species is boiled for the table; and although the taking of the bud is death to the tree, this is little regarded where vegetation goes on with a rapidity and luxuriance unknown in the colder parts of the world. The young sprouts arising from the seeds of P., when they have begun to vegetate, are another esculent of tropical countries. From the stems of some species of palm, as the Wax Palm (q. v.) of the Andes, and from the leaves of some, as the Carnahuba Palm (q. v.), wax is obtained, which is used for the same purposes as bees-wax. The wood of P. is used in house building, and for many other purposes; some affording very hard and beautiful wood for ornamental work, whilst others are suitable only for coarse purposes. The great leaf-stalks are also used for some of the purposes of timber. The stems of the most slender species are used for walking-sticks, &c., and, split or unsplit, for wicker-work. See RATTAN. The leaves of many P. are used for thatching houses. The spathes of some species are used as vessels or bags. The fibres of the leaf, the fibres connected with the leaf-stalk, the fibres of the rind of the fruit, and the fibres of the stem of different kinds of P. are used for making cordage, mats, nets, cloth, &c. The most important of these fibres are Coir (q. v.) or Cocoa-nut Fibre, Gomuto (q. v.) or Ejoo Fibre, and Piassaba (q. v.). The coarsest fibres are employed as bristles for making brushes, &c. Stripes of the delicate epidermis of the young unopened leaves of some South American P. are twisted, and so used for making a kind of thread; hammocks made of which are highly valued. See ASTROCARYUM. The leaves of the Palmyra Palm and Talipot Palm are used in some parts of the east for writing upon, an iron style being employed instead of a pen. One of the kinds of the resinous substance called *Dragon's Blood* is obtained from the fruit of a palm. The Betel (q. v.) Nut, abounding in catechu, is the fruit of a palm. The fruit of many P. is very acrid. The ashes of the fruits of some American species are used by the Indians as a substitute for salt, probably on account of potash, or some salt of potash, which they contain; and much potash may be obtained from the stems and leaves of palms. Vegetable Ivory (q. v.) is the kernel of the fruit of a palm; and somewhat similar to it in quality is the Coquilla Nut (q. v.). But a complete enumeration of the uses to which P. and their products are applied is almost impossible.

Some of the more important species of P. are noticed in separate articles.

About five hundred species are known; but it is

probable that many are still undescribed. The most complete work on P. is the monograph by Martius, *Genera et Species Palmarum* (3 vols., large folio, Munich, 1823—1845), a magnificent work, with 219 coloured plates; but many new species have been discovered since its publication.

The cultivation of P. in hothouses is attended with great expense. Separate houses are devoted to them in a few gardens, of which the greatest is that at Kew. A very fine palm-house has been erected in the Botanic Garden of Edinburgh. P. are cultivated in hothouses merely as objects of interest, and for the gratification of a refined taste, never for the sake of their fruit or any other product.

PALMYRA, the name given by the Greeks to a great and splendid city of Upper Syria. Its original Hebrew name was *Tadmor*, which, like the Greek word, means 'city of palma.' It was built, according to the writers of Kings (Book I. chap. ix. verse 18) and Chronicles (Book II. chap. viii. verse 4), by Solomon in the 10th c. B. C.; but it is more probable that he only enlarged it. It occupied a fertile oasis, well watered, and abounding in palm-trees. Barren and naked mountains overlook it from the west, and to the east and south stretches the illimitable sandy desert. P. was, in the Solomonic age, a bulwark of the Hebrew kingdom against the wandering hordes of Beduins; but its early history is obscure and insignificant. After the fall of Seleucia, it became a great centre of commercial intercourse between the east and the west of Asia. Its commercial importance, wealth, and magnificence greatly increased after the time of Trajan, who subjected the whole country to the Roman empire. In the 3d c., Odenathus, a Syrian, founded here an empire, which, after his murder, rose to great prosperity under his wife, Zenobia (q. v.), and included both Syria and Mesopotamia; but this was not of long duration, for the Roman Emperor Aurelian conquered it in the year 275, and the city was soon after almost entirely destroyed in revenge for the slaughter of a Roman garrison. It never recovered from this blow, although Justinian fortified it anew. The Saracens destroyed it in 744. A village called Tadmor, inhabited by a few Arab families, now occupies the site. The ruins of the ancient city, white and dazzling in the Syrian sun, excite at a little distance the admiration of all beholders; but when examined in detail, they are said to be far from imposing, though in regard to this latter point opinions differ. They were visited by English merchants resident at Aleppo in 1691, and again by Messrs Wood and Dawkins in 1751, and since then by a vast number of travellers. The ruins of a temple of Baal, the sun god, are, however, confessedly magnificent. The language of ancient Palmyrene appears, from inscriptions which remain, to have been an Aramaic language. See Murray's *Handbook for Syria and Palestine* by Porter (Lond. 1858).

PALMYRA PALM (*Borassus flabelliformis*), a species of palm with a magnificent crown of fan-shaped leaves, a native of the East Indies. The stem attains a height of 25—40, or even 60 feet, and tapers slightly upwards. The leaves are about four feet long, with stalks of about the same length, the stalks spiny at the edges; each leaf having 70—80 rays. The fruit is somewhat triangular, about the size of a child's head; having a thick, fibrous, and rather succulent yellowish-brown or glossy black rind, and containing three seeds each as large as a goose's egg. The P. P. is the most common palm of India, growing spontaneously in

condition of the nerves of the heart, or (2) an unhealthy condition of the blood.

1. Amongst the causes of disturbed innervation may be especially noticed the abuse of tea (especially green tea), coffee, spirits, and tobacco. Any irritation of the stomach and intestinal canal may be reflected to the heart; and hence palpitation may frequently be traced to flatulence, undue acidity, and intestinal worms, especially tape-worms. Everything that causes pressure on the heart, such as tight lacing, abdominal dropsy, or an enlarged uterus, is also liable to occasion this affection.

2. If the blood is abnormally rich and stimulating it may give rise to palpitation, as in Plethora (q. v.); but the opposite condition, known as Anæmia (q. v.), is a much more common cause of this affection. In anæmia the blood is watery and deficient in fibrine, and (far more) in red corpuscles; and being thus in an unnatural state, it acts as an unnatural stimulant, and induces frequent, although not usually strong pulsations. In cases of this kind, singular murmurs (not unlike those which are heard when we apply certain shells to the ear) are heard on applying the stethoscope to the neck over the course of the great jugular veins.

The age at which palpitation most usually comes on is from 15 to 25 years; and the affection—especially if it arise from anæmia—is very much more common in the female than in the male sex.

The treatment of palpitation must entirely depend upon its cause. The use of all nervous stimulants (tea, coffee, alcohol, and tobacco) should be suspended or abandoned. If the patient is clearly plethoric, with a full strong pulse, he should take saline cathartics, and live upon comparatively low diet (including little animal food) until this condition is removed. When, on the other hand, the palpitation is due to an anæmic condition, the remedies are preparations of iron, aloetic purgatives, an abundance of animal food, bitter ale, the cold shower-bath, and exercise, short of producing positive fatigue, in a pure bracing air. In the paroxysms, relief will often be afforded by the administration of a diffusible stimulant, such as ammoniated tincture of valerian, aromatic spirit of ammonia, &c.

PALSY. See PARALYSIS.

PALY. See PALK.

PAMLICO SOUND, a large bay on the coast of North Carolina, U.S., separated from the ocean by long, narrow islands of sand, an angle of the largest forming Cape Hatteras, and connected with the ocean by narrow passages, the chief of which is Ocracoke Inlet, and on the north with Albemarle Sound; it is 80 miles long, and from 10 to 30 miles wide, and receives the Neuse and Pamlico Rivers.

PAMPAS (in the Quichua tongue, 'a valley' or 'plain') is a term employed in a general sense as a designation of Southern American plains, in contradistinction to the 'prairies' of North America, and in this sense it is frequently employed by geographers. It is also used in Peru as a general designation of tracts of level land either on the coast or among the mountains, and in this sense occurs as a component of many proper names, being then transformed into *bamba*. The chief pampas in Peru are those of the Sacramento. But in its more special and proper signification, the word pampas is given to the immense and partly undulating plains bounded by the Rio Negro of Patagonia, the La Plata and Paraguay, and the base of the Cordilleras. These plains during the wet season afford abundant pasture to the many herds of wild oxen and

horses which roam over them, but they become rapidly parched under the burning heat of the sun, except in the low-lying tracts, or along the banks of rivers. The most fertile of the pampas lie westwards towards the Cordilleras. From the rapid alternation of vigorous growth with parching drought, the growth of trees is impossible, and their place is accordingly supplied by sparse groups of stunted shrubs. The soil, which is in general poor, is a diluvium composed of sandy clay, and abounds in the bones of extinct mammals. Strips of waterless desert, known as *travesias*, stretch across the pampas; these *travesias* are destitute of all vegetation with the exception of a few bushes, and are markedly distinct in geological character. The soil of the pampas is more or less impregnated with salt, and saltpetre abounds in many places. The wild animals of the pampas are horses, oxen (both introduced by the Spaniards), nandous, and guanaco. The skins of the horses and oxen, and the flesh of the latter, form a most important item in the trade of this region. The half-white inhabitants of the pampas are called Guachos (q. v.). The whole area of the pampas has been estimated at about 1,500,000 square miles.

PAMPAS GRASS (*Gyncrium argenteum*), a grass which covers the pampas in the south of Brazil and more southern parts of South America, and has been introduced into Britain as an ornamental plant. It is quite hardy, and its tufts have a splendid appearance. The leaves are six or eight



Pampas Grass (*Gyncrium argenteum*).

feet long, the ends hanging gracefully over; the flowering stems ten to fourteen feet high; the panicles of flowers silvery white, and from eighteen inches to two feet long. The herbage is too coarse to be of any agricultural value. The male and female flowers are on separate plants; in panicles; the spikelets 2-flowered, one floret stalked, and the other sessile; the pales of the female florets elongated, awn-shaped, and woolly.—Another species

Europe in pearls, mother-of-pearl, shells, and gold-dust, obtained in the vicinity. P. is chiefly important, however, as the Pacific terminus of the Panama Railway. This railway was completed in 1855, is about 40 miles in length, and connects P. on the Pacific with Aspinwall colony on the Atlantic. By means of it the route to California is much shortened, and mails from the Pacific are much facilitated. Pop. about 10,000. The former city of P., the seat of the Spanish colonial government established in 1518, stood six miles north-east of the port of P., and is now a heap of ruins.

PANAMA, ISTHMUS OF, is that portion of the narrow ridge of mountainous country connecting Central and South America, which is bounded on the W. by the frontier of Costa Rica, and on the E. by the surveyed inter-oceanic route from the Bay of Caledonia on the N. to the Gulf of San Miguel on the S. or Pacific side. It extends in long. from 77° to 83° W. The 'State' of P., one of those which form the Granadian Confederation, is co-extensive with the isthmus of the same name. Area, 29,756; pop. estimated in 1861 at 175,000, exclusive of 8000 independent Indians. The Isthmus is traversed throughout by a chain of mountains forming the barrier between the Atlantic and Pacific Oceans, and of which the highest peak is that of Picacho (7200 feet) in the west. Numerous streams, the largest of which is the Tuira (162 miles long, and navigable for 102 miles), fall into both oceans. On the Pacific shores are numerous beautiful islands, among which Las Perlas, so called from their pearl fisheries, and the island of Coiba, are the chief. On the north coast, the principal harbours are the Chiriqui Lagoon, San Blas, and Caledonia; on the south shore, Damas in the island of Coiba, the Bay of San Miguel, and Golfo Dulce. Gold, which in ancient times was obtained here in great quantities, is still found, and mines of salt, copper, iron, coal, &c., are worked. The climate is unhealthy, except in the interior and on the flanks of the mountains. Almost all the plants of the torrid zone may be raised here, but maize, rice, plantains, &c. (grown for the purpose of supplying the transit), are the chief crops. Cotton of excellent quality is indigenous and perennial; cloth and grass hammocks, grass (Panama) hats, matting, &c., are manufactured. Commerce, however, affords the principal employment.

In 1855 a railway across the Isthmus, from Aspinwall city on the Atlantic to Panama on the Pacific, was opened. See PANAMA. The Isthmus has frequently been surveyed with the object of finding a route for an inter-oceanic canal. As yet the inability of the government of New Granada to provide the requisite funds has stood in the way of the accomplishment of this design. The scheme of an inter-oceanic canal, however, is a practicable one, and in time it will in all probability be carried out.

PANATHENÆA, the most famous festival of Attica, celebrated at Athens in honour of Athene, patron goddess of the city, and intended to remind the people of Attica of their union into one community by the mythical Theseus. Before the time of Theseus, or—to speak more critically—before the formation of the Attic confederacy, this festival was only for the citizens of Athens, and was called simply *Athenæa*. According to tradition, the *Athenæa* owed its origin to King Erichthonius about 1506 or 1521 B.C. The later Panathenæa appears to have been a double festival. All writers who mention it, speak of a Lesser and Greater Panathenæa, the former held annually, the latter every fourth year. Both took place in the month *Hecc-*

tombeon (July), and lasted several days. The Lesser Panathenæa was celebrated with gymnastic games, musical competitions, declamations, and a torch race in the evening, the whole concluding with the sacrifice of an ox. The prize of the victors was a vessel filled with oil from the sacred tree on the Acropolis. The Greater Panathenæa only differed from the Lesser in being more solemn and magnificent. Rhapsodists sang the Homeric poems; dramatic representations were given; and a splendid procession took place to the temple of Athene Polias, on the last day of the festival, to present the goddess with a *peplus* or embroidered robe, of crocus colour, woven by the maidens (*erynnistai*) of the city. Not alone the Athenians, but the whole population of Attica poured forth on this occasion. The procession is grandly sculptured on the frieze of the Parthenon by Phidias and his disciples.

PANAX. See GINSENG.

PANCAKE. This article of food is prepared by pouring a rich batter of flour, eggs, and milk into a frying-pan, so as to cover it about half an inch in thickness; the pan having been previously heated, and well supplied with butter, lard, or olive oil. A quick fire is necessary to cook it well, and when the under side is done, a dexterous cook by jerking the frying-pan manages to reverse the cake, so as to bring the upper side downward to be cooked in its turn. It is now a common practice to make pancakes rather smaller than the bottom of the pan, and frequently to add minced apples and other materials to vary and flavour them; these are, however, better known under the name of Fritters.

This dish is particularly associated with Shrove Tuesday, but the origin of the connection is by no means clear. Perhaps it is the relic of a heathen custom. The Saxons called February, *Solmonath*, 'which,' says a writer in *Notes and Queries* (First Series, vol. v. p. 491), 'Dr Frank Sayers, in his *Disquisitions*, says is explained by Bede, *Menius Placentarum*, and rendered by Spelman, in an unedited MS., "Pancake month," because, in the course of it, pancakes were offered by the pagan Saxons to the sun.'

PANCHATANTRA (literally, the five books) is the name of the celebrated Sanscrit fable-book of the Hindus whence the *Hitopadesa* (q. v.) was compiled and enlarged. Its authorship is ascribed to a Brahman of the name of Vishnu'sarma, who, as its introduction in a later recension relates, had undertaken to instruct, within six months, the unruly sons of Amarasakti, a king of Mahilāropya or Mihilāropya, in all branches of knowledge required by a king, and for this purpose composed this work. If the latter part of this story be true, it is more probable, however, as Professor Benfey assumes, that Vishnu'sarma was merely the teacher of the princes, and that the existing work itself was composed by some other personage; for an older recension of the work does not speak of his having brought his tales into the shape of a work. The arrangement of the P. is quite similar to that of the *Hitopadesa*. The fables are narrated in prose, and the morals drawn from or connected with them are interwoven with the narrative in verse; many such verses, if not all, being quotations from older works.—On the history of the P., and its relation to the fable-books and fables of other nations, see the excellent work of Professor Theodor Benfey, *Panchatantra: fünf Bücher indischer Fabeln, Märchen und Erzählungen* (2 vols., Leip. 1859), the first volume containing his historical and critical researches on, and the latter

yield. VEGETABLE IVORY (q. v.) is another of the palm-like section of this order.

PĀN'DAVAS, or the descendants of Pān'd'u (q. v.), is the name of the five princes whose contest for regal supremacy with their cousins, the Kurus (q. v.), the sons of Dhṛitarāshṭra, forms the foundation of the narrative of the great epic poem, the *Mahābhārata* (q. v.). Their names are Yudhisht'hira, Bhīma, Arjuna, Nakula, and Sahadeva—the former three being the sons of Pān'd'u, by one of his wives, Prithā; and the latter two, by his other wife, Mādrī. But though Pān'd'u is thus the recognised father of these princes, the legend of the *Mahābhārata* looks upon him, in truth, merely as their father by courtesy; for it relates that Yudhisht'hira was the son of Dharma, the god of justice; Bhīma, of Vāyu, the god of wind; Arjuna, of Indra, the god of the firmament; and Nakula and Sahadeva, of the As'vins, the twin-sons of the sun.

PANDECTS (Gr. *Pandecton*, all receiving; from *pan*, all, and *dechomai*, I receive), one of the celebrated legislative works of the Emperor Justinian (q. v.), called also by the name *Digestum*, or *Digest*. It was an attempt to form a complete system of law from the authoritative commentaries of the jurists upon the laws of Rome. The compilation of the Pandect was undertaken after that great collection of the laws themselves which is known as the *Codex Justinianus*. It was intrusted to the celebrated Tribonianus, who had already distinguished himself in the preparation of the *Codex*. Tribonianus formed a commission consisting of 17 members, who were occupied from the year 530 till 533 in examining, selecting, compressing, and systematising the authorities, consisting of upwards of 2000 treatises, whose interpretation of the ancient laws of Rome was from that time forward to be adopted with the authority of law. A period of ten years had been allowed them for the completion of their work; but so diligently did they prosecute it, that it was completed in less than one-third of the allotted time; and some idea of its extent may be formed from the fact that it contains upwards of 9000 separate extracts, selected according to subjects from the 2000 treatises referred to above.

The Pandects are divided into 50 Books, and also into 7 Parts, which correspond respectively with Books 1—4, 5—11, 12—19, 20—27, 28—35, 36—44, and 45—50. Of these divisions, however, the latter (into Parts) is seldom attended to in citations. Each Book is subdivided into Titles, under which are arranged the extracts from the various jurists, who are 39 in number, and are by some called the classical jurists, although other writers on Roman law confine that appellation to five of the number, Papinian, Paulus, Ulpian, Gaius (q. v.), and Modestinus. The extracts from these indeed constitute the bulk of the collection; those from Ulpian alone making one-third of the whole work, those from Paulus one-sixth, and those from Papinian one-twelfth. Other writers besides these 39 are cited, but only indirectly, i. e., when cited by the jurists whose works form the basis of the collection. The principle upon which the internal arrangement of the extracts from individual writers was made had long been a subject of controversy. The question seems now to be satisfactorily solved; but the details of the discussion would carry us beyond the prescribed limits. Of the execution of the work, it may be said that although not free from repetition (the same extracts occurring under different heads), and from occasional inaptness of citation, and other inconsistencies, yet it deserves the very highest commendation. In its relations to the history and literature of ancient Rome it is invaluable; and

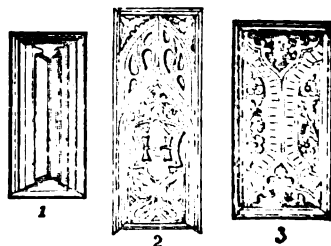
taken along with its necessary complement the *Codex*, it may justly be regarded (having been the basis of all the mediæval legislation) as of the utmost value to the study of the principles not alone of Roman, but of all European law.

PANDŌRA (i. e., the 'All-endowed'), according to Grecian myth, was the first woman on the earth. When Prometheus had stolen fire from Jupiter, Zeus instigated Hephestus to make woman out of earth to bring vexation upon man by her graces. The gods endowed her with every gift necessary for this purpose, beauty, boldness, cunning, &c.; and Zeus sent her to Epimetheus, the brother of Prometheus, who forgot his brother's warning against receiving any gift from Zeus. A later form of the myth represents P. as possessing a vessel or box filled with winged blessings, which mankind would have continued to enjoy if curiosity had not prompted her to open it, when all the blessings flew out, except Hope.

PANDOURS, a people of Servian origin who live scattered among the mountains of Hungary, near the village of Pandour in the county of Solik. The name has been applied to that portion of the light-armed infantry in the Austrian service which is raised in the Slavonian districts on the Turkish frontier. The P. originally fought under the orders of their own proper chief, who was called Harūn-Basha, and rendered essential service to the Austrians during the Spanish War of Succession, and afterwards in the Seven Years' War. They originally fought after the fashion of the 'free lances,' and were a terror to the enemy whom they annoyed incessantly. Their appearance was exceedingly picturesque, being somewhat oriental in character, and their arms consisted of a musket, pistols, a Hungarian sabre, and two Turkish poniards. Their habits of brigandage and cruelty rendered them, however, as much a terror to the people they defended as to the enemy. Since 1750 they have been gradually put under a stricter discipline, and are now incorporated with the Austrian frontier regiments.

PĀN'D'U, literally, 'white,' is the name of the father of the Pān'd'avas (q. v.), and the brother of Dhṛitarāshṭra. Although the elder of the two princes, he was rendered by his 'pallor'—implying, perhaps, a kind of disease—incapable of succession, and therefore obliged to relinquish his claim to his brother. He retired to the Himalaya Mountains, where his sons were born, and where he died. His renunciation of the throne became thus the cause of contest between the Pān'd'avas, his sons, and the Kurus, or the sons of Dhṛitarāshṭra.

PANEL (through Fr. from Lat. *pannus*, a piece



Panels.

of cloth, a patch), a space or compartment of a wall, ceiling, woodwork, &c., enclosed by beams, mouldings, framing, and so forth. It is generally sunk under the plane of the surrounding style. In

inspired seers, and at a later period of Sanscrit literature, was supposed to have received the fundamental rules of his work from the god Śiva himself. Of the personal history of P., nothing positive is known, except that he was a native of the village S'alātura, situated north-west of Attock, on the Indus—whence he is also surnamed S'alāturiya—and that his mother was called Dākshī, wherefore, on his mother's side, he must have been a descendant of the celebrated family of Dakṣha. A tale-book, the *Kathāsaritsāgara* (i. e., the ocean for the rivers of tales), gives, indeed, some circumstantial account of the life and death of P.; but its narrative is so absurd, and the work itself of so modern a date—it was written in Cashmere, at the beginning of the 12th c.—that no credit whatever can be attached to the facts related by it, or to the inferences which modern scholars have drawn from them. According to the views expressed by Goldstücker (*Pānini, his Place in Sanscrit Literature*: London, 1861), it is probable that P. lived before S'ākyamuni, the founder of the Buddhist religion, whose death took place about 543 B.C., but that a more definite date of the great grammarian has but little chance of ascertainment in the actual condition of Sanscrit philology.—The grammar of P. consists of eight Adhyāyas, or books, each book comprising four Pādas, or chapters, and each chapter a number of Sūtras (q. v.), or aphoristical rules. The latter amount in the whole to 3996; but three, perhaps four, of them did not originally belong to the work of Pānini. The arrangement of these rules differs completely from what a European would expect in a grammatical work, for it is based on the principle of tracing linguistic phenomena, and not concerned in the classification of the linguistic material, according to the so-called parts of speech. A chapter, for instance, treating of a prolongation of vowels, will deal with such a fact wherever it occurs, be it in the formation of bases, or in conjugation, declension, composition, &c. The rules of conjugation, declension, &c., are, for the same reason, not to be met with in the same chapter or in the same order in which European grammars would teach them; nor would any single book or chapter, however apparently more systematically arranged—from a European point of view—such as the chapters on affixes or composition, suffice by itself to convey the full linguistic material concerned in it, apart from the rest of the work. In a general manner, P.'s work may therefore be called a natural history of the Sanscrit language, in the sense that it has the strict tendency of giving an accurate description of facts, instead of making such a description subservient to the theories according to which the linguistic material is usually distributed by European grammarians. Whatever objections may be raised against such an arrangement, the very fact of its differing from that in our grammars makes it peculiarly instructive to the European student, as it accustoms his mind to survey language from another point of view than that usually presented to him, and as it must induce him, too, to question the soundness of many linguistic theories now looked upon as axiomatic truths. As the method of P. requires in a student the power of combining many rules scattered all over the work, and of combining, also, many inferences to be drawn from these rules, it exercises, moreover, on the mind of the student an effect analogous to that which is supposed to be the peculiar advantage of the study of mathematics. The rules of P. were criticised and completed by Kātyāyana (q. v.), who, according to all probability, was the teacher, and therefore the contemporary, of Patanjali; and he, in his turn, was criticised by Patanjali (q. v.),

who sides frequently with Pānini. These three authors are the canonical triad of the grammarians of India; and their works are, in truth, so remarkable in their own department, that they exceed in literary merit nearly all, if not all, grammatical productions of other nations, so far as the two classes are comparable. The rules of P. were commented on by many authors. The best existing commentary on them is that called the *Ādīkṛitī*, by Vāmana Jayāditya, which follows these rules in their original order. At a later period, attempts were made to arrange the rules of P. in a manner which approaches more to the European method; the chief work of this category is the *Siddhānta-Kaumudī*, by Bhaṭṭoḥji-dīkṣhita. P. mentions, in his Sūtras, several grammarians who preceded him, amongst others, S'ākātayana. Manuscripts of a grammar ascribed to a grammarian of this name exist in the Library of the India Office in London, and in the Library of the Board of Examiners at Madras. On the ground of a few pages only of the latter an attempt has been very recently made to prove that this grammar is the one referred to by P., and therefore older than the work of the latter. But the facts adduced in proof of this hypothesis are so ludicrously weak, and the reasoning upon them so feeble and inconclusive, whereas the evidence in favour of the comparatively recent date of this work is so strong, that no value whatever can be attached to this hasty hypothesis. For the present, therefore, P.'s work still remains the oldest existing grammatical work of India, and probably of the human race. The Sūtras of P., with a modern commentary by two native pandits, and with extracts from the *Vārtikas* of Kātyāyana and the *Mahābhāṣya* of Patanjali, were edited at Calcutta in 1809. This edition, together with the modern commentary, but with garbled extracts from the extracts mentioned, was reprinted at Bonn in 1839—1840 by Dr O. Bohtlingk, who added to it remarks of his own and some indices.—For the literature connected with P., see Colebrooke's preface to his *Grammar of the Sanscrit Language* (Calc. 1805), and Goldstücker's *Pānini*, &c., as mentioned above.

PANIPUT, the chief town of a district of the same name in the province of Delhi, is situated 54 miles (by road 78 miles) north by west from Delhi, in a fertile tract, the resources of which are largely developed by artificial irrigation. Pop. (1853) 22,612. Being a station on the great military road between Afghanistan and the Punjab, and to some extent an outpost of Delhi, it has been at various times the scene of strife between the inhabitants of India and invaders. The first great battle of P. was fought in 1526, and gained by Mirza Baber, the ex-ruler of Ferghana, at the head of 12,000 Mongols, over Ibrahim the emperor of Delhi, whose unwieldy array numbered 100,000 men, with 1000 elephants. This victory seated Baber on the throne of Hindustan as the first of the 'Great Mogul' dynasty. The second great battle was fought, in 1556, by the Mongols under Akbar, grandson of Baber, and third of the Mogul emperors, against Hemu, an Indian prince who had usurped the throne of Delhi. Hemu's army was defeated with great slaughter, and himself slain. The third battle was fought on the 14th of January 1761, between Ahmed Abdallī, ruler of Afghanistan, and the till then invincible Mahrattas. The Jats, who had been forced to join the Mahrattas, deserted to the Afghans at a time when victory seemed to be declaring for the former; and this act of treachery, together with the loss of their leaders, threw the Mahrattas into confusion, and in spite of their most resolute valour they suffered a total defeat.

They left 50,000 slain on the field of battle, including all their leaders except Holkar, and 30,000 men were killed in the pursuit, which was continued for four days. The Maharrattas never recovered this crushing blow. It was at Kurnaul, a town a little to the north of P., that Nadir Shah of Persia, in 1739, won the celebrated battle over the Mogul emperor, which placed North-Western India at his feet.

PANIZZI, ANTONIO, principal librarian of the British Museum, was born, on the 16th of September 1797, at Brescello, in the *ci-devant* duchy of Modena. For his education he was sent first to the public school of Reggio, and afterwards to the university of Padua, where, in 1818, he took the degree of Doctor of Laws, with a view to practising at the bar. Early in life his sympathies were enlisted on behalf of the friends of Italy, as opposed to domestic tyranny and foreign intrusion, and when, in 1821, the popular revolution broke out in Piedmont, the young advocate became one of its leaders. The attempt, however, failed; and P., who had been denounced by a pretended friend, was arrested at Cremona. Having by some means contrived to escape, he took refuge in Lugano, and from thence in a short time found his way to Geneva. Meanwhile, during his absence, he was tried at home *per contumaciam*, as it is called, and sentenced to death, with confiscation of property. Nor was he allowed to remain at Geneva. The governments of Austria and Sardinia demanded from the Swiss Confederation the expulsion of all concerned in the recent outbreak, and among these P. was obliged to depart. Forbidden to pass through France, he reached England by way of Germany and the Netherlands. He now resided for about a month in London, whence he proceeded to Liverpool, with an introduction from Ugo Foscolo to Roscoe the historian, who received him with the utmost hospitality. At Liverpool, where he was introduced into the best circles by Mr Roscoe, he taught Italian, and continued to reside in that town until 1828, when he came to London again, and was chosen professor of Italian in the university of London, just then opened for students. In 1831, through the instrumentality of Lord Brougham, he was appointed one of the assistant-librarians in the British Museum; and upon the retirement of the Rev. Mr Baber, in 1837, from the office of Keeper of the Printed Books, Mr P. was appointed his successor. In the previous year there had been a parliamentary committee on the state of the British Museum, before which Mr P. gave valuable evidence, and likewise urged the adoption of measures for the improvement and augmentation of the library, which, upon becoming keeper, he was in a still better position to advocate. In 1838 he superintended the removal of the printed books from the old suite of rooms in Montague House to the new library; and in the same year, in conjunction with some of his assistants, he drew up the well-known 91 rules for the formation of a new catalogue of the library. These rules were approved by the trustees, and the first volume of a catalogue framed after them was printed and published in 1841. No other volume has been since published, and Mr P., before a royal commission of inquiry into the Museum in 1847, justified the suspension of the printing until the whole catalogue should be finished. In 1845, Mr P. drew up an elaborate report of the deficiencies existing in the library, in consequence of which the trustees applied to the Lords of the Treasury for 'an annual grant of £10,000 for some years to come, for the purchase of books of all descriptions.' This grant having been obtained, the library rapidly increased in numbers, to such a degree that in 1849 the books

amounted to 435,000, as compared with 235,000, the ascertained number in 1838. The number of volumes is now estimated at between 600,000 and 700,000. Upon the resignation of Sir H. Ellis, in 1856, Mr P. was appointed to the post of principal librarian of the British Museum, which office he still holds. In a literary capacity, Mr P. is known by an edition of the *Orlando Innamorato di Boiardo*, and *Orlando Furioso di Ariosto: with an Essay on the Romantic Narrative Poetry of the Italians, Memoirs and Notes*, by A. Panizzi (9 vols. Lond. 1830-1834). He has also edited the *Sonetti e Canzone* of Boiardo (Lond. 1835), and a collection of reprints of the first four editions of the *Divina Commedia*, printed at the expense of Lord Vernon (Lond. 1853). He is also the author of a privately-printed pamphlet, *Chi era Francesco da Bologna*, tending to prove the identity of the type-founder employed by Aldus, and the inventor of the well-known Aldine or Italic type, with the celebrated painter Francesco Francia. Mr P. is also understood to have written some articles of literary or historic character for more than one of the Quarterly Reviews.

PA'NJIM. See GOA.

PAN'NAH, or PUNNAH, a decayed town of India, in the district of Bundelcund, stands on the north-eastern slope of a plateau, 115 miles south-west of Allahabad. It was formerly a large, thriving, and well-built town; but whole streets are now desolate, or are tenanted only by monkeys, which, posted on the roof or at the windows, view the town's-people without alarm. The palace of the rajah is a beautiful building, surmounted by elegant kiosks, but is in many places ruinous. The source of the former prosperity of P. was its rich diamond mines. Owing to the diminished value of the gem, however, and the increased tax upon the produce of the mines, this branch of industry has much fallen off. The diamonds are generally tinted with colour; very few of them being of first-water, or completely colourless. This town is the chief place of a territory of the same name, which is bounded on the north by the British district of Banda, and on the south by the British district of Nerbudda. See BUNDEL-CUND.

PANNELS, in Artillery, are the carriages upon which mortars and their beds are conveyed on a march.

PANNO'NIA, a province of the ancient Roman empire, bounded on the N. and E. by the Danube, on the W. by the mountains of Noricum, and on the S. reaching a little way across the Save; and thus including part of modern Hungary, Slavonia, parts of Bosnia, of Croatia, and of Carniola, Styria, and Lower Austria. It received its name from the Pannonians, a race of doubtful origin, but who at first dwelt in the country between the Dalmatian Mountains and the Save, in modern Bosnia, and afterwards more to the south-east in Moesia. The Roman arms were first turned against them and their neighbours, the Iapydes, by Augustus in 35 a.c., and after the conquest of Segestica or Siscia (Siszek) he subdued them. An insurrection took place in 12 B. C., which Tiberius crushed after a long struggle; and a more formidable one of the Dalmatians and Pannonians together in 6 A. D., which was suppressed by Tiberius and Germanicus, but not till 8 A. D. Fifteen legions had to be assembled against the Pannonians, who mustered 200,000 warriors. Hereupon the Pannonians settled in the more northern countries, which received their name, and of which the former inhabitants, the Celtic Boii, had been in great part destroyed in Caesar's time. The country was now formed into a Roman

province, which was secured against the inroads of the Marcomanni and Quadi by the Danube, and on its other frontiers had a line of fortresses. Military roads were constructed by the conquerors, who also planted in the country many colonies and municipia, and thus gave it a rough coating of civilisation. Great numbers of the Pannonian youth were drafted into the Roman legions, and proved, when disciplined, among the bravest and most effective soldiers in the imperial army. P. was subsequently divided into Upper (or Western) and Lower (or Eastern) P., and under Galerius and Constantine underwent other changes. Upper Pannonia was the scene of the Marcomannic war in the 2d century. In the 5th c. it was transferred from the Western to the Eastern Empire, and afterwards given up to the Huns. After Attila's death, in 453, the Ostrogoths obtained possession of it. The Longobards under Alboin made themselves masters of it in 527, and relinquished it to the Avari upon commencing their expedition to Italy. Slavonian tribes also settled in the south. Charlemagne brought it under his sceptre. In the reigns of his successors, the Slavonians spread northward, and the country became a part of the great Moravian kingdom, till the Magyars or Hungarians took it in the end of the 9th century. In the time of the Romans, Siscia (Siszek), Vindobona (Vienna), Carnuntum (near Haimburg), and Arrabo (Raab) were among its principal towns.

PANORAMA (Gr. *pan*, all, *orama*, a view), a pictorial representation of the whole surrounding landscape as seen from one point. The invention of the panorama is claimed by the Germans for Professor Breisig of Danzig, but it does not appear that he ever constructed one. The real inventor was Mr Barker, an ingenious artist of Edinburgh, to whom the idea occurred while taking a sketch of the city from the top of Arthur Seat. After surmounting numerous difficulties—one of which was the invention of a new kind of perspective for the horizontal lines—he succeeded in producing an effective panoramic view of Edinburgh, which was exhibited in that city in 1788, and in London in the following year. The next panorama executed by Barker was a view of London from the top of the Albion Mills. A large building was now erected in Leicester Square for the exhibition of such views. On Mr Barker's death in 1806, he was succeeded by his son, in partnership with a pupil, Mr Burford, the painter of the chief modern panoramas. The first step in the construction of a panorama is to obtain sketches of the entire region to be represented; each sketch is a representation of a portion of the landscape in the form of a sector of a circle, with the sketcher's position as a centre, and the horizon for circumference. The canvas to which the sketches are to be transferred is hung round the sides of a circular room, and forms the surface of a cylinder, on the inside of which the panorama is painted. The canvas, brushes, &c., are of the finest description manufactured, and the painting and colouring are elaborated in the most careful manner, in order to render the optical illusion—which every one who has seen a good panorama must have experienced—as complete as possible. The stage from which the picture is viewed is placed in the centre of the room, about 30 feet on every side from the picture; the picture itself is fastened above to a strong circular hoop, and, hanging down, has its lower edge fastened to a similar hoop, which is heavily weighted to keep the picture steady. The light is admitted by an aperture in the roof, which is concealed by an awning from the spectators on the stage. Notwithstanding important defects in the panorama, one of which is

that the light more strongly illumines the upper than the lower parts of the picture—thus throwing the foreground comparatively into shade—many cases are on record of spectators being for the time completely under the influence of mental illusion. One of the best instances of this occurred during the exhibition of the third panorama in London. Part of the view consisted of a representation of the wreck of a ship's boat, with sailors struggling in the waves; and at sight of this, a dog belonging to one of the spectators at once leaped over the handrail to the rescue of the supposed drowning men. Panoramas, though frequently exhibited in France, Germany, and other European countries, have met with little success out of Great Britain. The most popular panorama ever executed was that of the Battle of Waterloo, the exhibition of which brought in ten thousand pounds. There are many modifications of the panoramas, but that above described is the most important.

PANSLAVISM. This term is applied to the movement lately set on foot, and generally ascribed to Russian influence, for the amalgamation of all races of Slavonic descent into one body, having one language, one literature, and one social polity. The writings of Adam Gurowski and Kollar, and the anonymous pamphlet which appeared at Leipzig in 1837, under the title of *Die Europäische Pentarchie*, have exercised a very widespread influence in this direction among all the Slavonic people of the German states; and although the other nations of Europe have hitherto had no reason to anticipate any practical results from a movement towards Panslavism, the Slavonians of the Austrian empire have always taken occasion to shew that they regarded themselves as standing apart from German interests in times of public disturbance. Thus, in 1848, instead of taking part with their fellow-citizens in the election of representatives to the German parliament at Frankfurt, the leading promoters of Panslavism summoned a Slavonic congress at Prague, which was attended by Slavonians from Bohemia, Moravia, and Silesia, and by Slavonic Poles, Croats, Servians, and Dalmatians, who appeared in their national costumes. The impracticability of the grand schemes promulgated in the manifestoes of the conclave, was sufficiently shewn by the necessity under which the members found themselves of employing German as the only language commonly understood by all. Disunion and dissensions were the speedy result of this incongruous meeting, whose seditious turbulence at last was summarily put down by the bombardment of the city of Prague, and the imprisonment of the leading agitators. Since that period, the striving towards Panslavism, although ever present as the guiding influence of all Slavonic insurrectionary movements, has found no further public expression.

PANSY. See **VIOLET**.

PANTAGRAPH (Gr. *panta*, all, *graphein*, to delineate), an instrument by the aid of which any engraving may be copied on paper, though its use is in practice restricted to the copying of maps and plans. The copy can be drawn to any scale. The instrument consists of four rods, AB, AC, DE, and EF, jointed together, as in the figure; the points D and E are so taken that AD is equal to EF, and AE to DE, and consequently ADEF is always a parallelogram. If C be a determinate point near the end of the rod AE, and any line, CHB, be drawn cutting the other three rods, the triangles BAC and BDH are similar; so that when the point B is fixed, the points C and H, which can, from the structure of the instrument,

and differed from atheism rather in name than in fact. But the most decided and the most spiritual representatives of this philosophy among the Greeks were the so-called 'Alexandrian' *Neo-Platonists* (q. v.), in whom we see clearly, for the first time, the influence of the East upon Greek thought. The doctrines of Emanation, of Ecstasy, expounded by Plotinus (q. v.) and Proclus (q. v.), no less than the fantastic Demonism of Iamblichus (q. v.), point to Persia and India as their birthplace, and in fact differ from the mystic teaching of the Vedanta only by being presented in a more logical and intelligible form, and divested of the peculiar mythological allusions in which the philosophy of the latter is sometimes dressed up.

During the middle ages, speculation was, for the most part, held in with tight reins by the church, and in consequence we hear little of pantheism. Almost the only philosopher who advocated, or who even seems to have thought about it, is John Scotus Erigena (see ERIGENA), who was probably led to it by his study of the Alexandrians, but his speculations do not appear to have been thought by him incompatible with a Christian faith; and in point of fact there are several profoundly mystical expressions employed in the New Testament, especially in the Epistles of John, in which the soaring spiritualism of Christianity culminates in language that has at least a pantheistic form; e.g., 'God is love; and he that dwelleth in love dwelleth in God, and God in him.' Erigena is regarded as the link that unites ancient and modern pantheism. We find in him now a reflection of the East and of Greece, and now a foreshadowing of the doctrines of Schelling and Hegel. His opinions were, with some scholastic modifications, introduced, in the 12th and 13th centuries, into theology by Amalric or Amaury de Chartres (a disciple also of Abelard), and his pupil David de Dinant, who were condemned as heretics by a council held at Paris.

Modern pantheism first shows itself in Giordano Bruno (q. v.), burned at Rome for his opinions in 1600. In Bruno reappear the speculations of the Eleatics and of the Neo-Platonists, but with a still more definite recognition than we meet with in them of an absolutely perfect supreme spirit. The universe, in the eyes of the unfortunate Italian, is not, properly speaking, a creation, but only an emanation of the Infinite mind—the eternal expression of its infinite activity; and hence the Infinite mind penetrates and fills, with different degrees of consciousness, all the heights and depths of the universe. To see God everywhere, to realise that He alone is, and that all else is but a perishable phenomenon or passing illusion—that there is but one intelligence in God, man, beast, and what we call matter—this should be the aim of all true philosophy. Spinoza (q. v.) comes next among pantheists in the order of time, but he is perhaps the greatest, certainly the most rigorous and precise of the whole class that either the ancient or the modern world has seen. His system is based, like the geometry of Euclid, on certain definitions and axioms, and he claims to have given it as conclusive and mathematical a demonstration as the latter. None will deny the keenness and cogency of his ratiocination. But human beings will not be forced into pantheistic convictions by any mere logical goad, however sharp; and the system, impregnable as it seems, has never had a formal adherent. The principal result at which, after a long, firm-linked chain of reasoning, Spinoza arrives, is, that there is but one substance, infinite, self-existent, eternal, necessary, simple, and indivisible, of which all else are but the modes. This substance is the self-existent God. To call Spinoza an atheist is ridi-

culous. The extravagant phrase of Schleiermacher, 'a God-intoxicated man' (*ein Gott trankener mann*), would be greatly nearer the truth, for no human system of philosophy whatever exhibits such an all-controlling and even overwhelming sense of the omnipresent God. Many critics have said that he was far more of an old Hebrew in his system than he dreamed. Although he had no direct followers, he exercised great influence on the development of metaphysical speculation in Germany, where, with the exception of Kant (q. v.), the three greatest philosophers of recent times—Fichte (q. v.), Schelling (q. v.), and Hegel (q. v.)—have all promulgated systems of a thoroughly pantheistic and ideal character. Neither England, France, nor America has produced a single great pantheistic philosopher (unless Mr Emerson be regarded as such); but there is an immense amount of pantheistic sentiment floating about in the poetry, criticism, theology, and even in the speculative thinking, in these and all European countries in the present age. This is attributable to the ravages made by biblical criticism, and the progress of the physical sciences in the region of religious beliefs. Multitudes of men are puzzled what to think and what to believe. They do not like to face the fact that they have actually lost faith in revelation, and are no longer relying for help and guidance on the Spirit of God, but on the laws of nature; so they take refuge from the abhorred aspect of the naked truth that they are 'atheists' in a cloud of rose-coloured poetical phrases, which, if they mean anything, mean pantheism.

PANTHE'ON, a Greek or Roman temple dedicated to all the gods. The 'Pantheon' of Rome

Half Section of Pantheon (from Ferguson).

(now a church) is a building deservedly celebrated for its fine dome. It suggested the idea of the domes of modern times.

PANTHER (*Felis pardus*), one of the largest *Felidae*, now generally supposed to be identical with the Leopard (q. v.), or a mere variety of it, differing only in a somewhat larger size and deeper colour. Cuvier, however, distinguishes

but he was signally defeated by the Comte de Vaux, at the head of the French troops, and the French became masters of the island. After one year's struggle, P. was compelled to take refuge on board of a British frigate, in which he sailed for England, where he was treated with general sympathy. Twenty years afterwards, the French revolution of 1789 recalled him to Corsica, and as a zealous republican he entered into the schemes of the revolutionary party; but during the anarchy of France in 1792—1793, he conceived a scheme for making Corsica an independent republic. Until this time he had been on the best terms with the Bonaparte family, but they now joined the Jacobin party whilst he allied himself with Britain, favoured the landing of 2000 British troops in the island in 1794, and joined them in driving out the French. He then surrendered the island to George III., but becoming dissatisfied with the government, he quarrelled with the British viceroy, whilst many of his countrymen were displeased with the course he had adopted in allying himself with the British. He therefore retired from the island in 1796, and spent the remainder of his life in the neighbourhood of London. P. died near London, February 5, 1807.

PAPA, a large market-town in the west of Hungary, stands in a beautiful district on the Tapolca, an affluent of the Marczal, 60 miles south-east of Presburg. It contains a stately castle, with a beautiful garden, handsome Catholic and Lutheran churches, a Catholic gymnasium, Reformed college, and an hospital. Stoneware, cloth, and pipes are manufactured, and a trade in wine is carried on. Pop. 12,400.

PAPA, the Latin form of the title now, in the Western Church, given exclusively to the Bishop of Rome. Originally, however, meaning simply 'father,' it was given indiscriminately to all bishops. Tertullian (*De Pudicitia*, cxiii.) so employs it. Dionysius, a priest of Alexandria, calls his bishop Papa Heraclias. St Cyprian, in the letters of his clergy, is addressed *Beatissimo Papa Cypriano*. The same form is employed towards him by the clergy of Rome itself. Even Arius so addresses his own bishop Alexander. In the next century, St Jerome addresses the same title to Athanasius, to Epiphanius, and most of all to Augustine. Indeed it would appear certain that down to the time of Gregory of Tours it was used not uncommonly of bishops in the Western Church. And there are evidences of its being occasionally applied to the inferior clergy, for whom, however, some adjunct was employed, in order to distinguish them from bishops. Thus, we sometimes read of *pape pisinni*, minor popes; and the tonsure was called by the name *papa letra*. In the Greek Church, as is well known, whether in Greece Proper or in Russia, *papa* is the common appellation of the clergy. The circumstance of its having been originally of general application, is acknowledged by all learned Roman Catholic controversialists and historians.

PAPACY. See **POPE**.

PAPAL STATES (Italian, *STATI DELLA CHIESA*, or *STATI PONTIFICI*), a territory, or rather group of states in Central Italy, formerly united into one sovereignty, with the pope for its head. It was of an irregular form, resembling the letter Z, the upper portion lying to the east of the Apennines, the lower to the west of that range, these two being connected by a third strip, which crossed the peninsula from east to west. The P. S. were bounded on the N. by the Po, on the S. by Naples, on the E. by the Gulf of Venice and Naples, and on the W. by Modena, Tuscany, and the Tyrrhenian Sea.

Detached portions, as Benevento and Pontecorvo, lay within the Neapolitan territory. The country is traversed by the Apennines, which attain their highest elevation in the Monte della Sibilla, which is about 7402 feet above sea-level. Owing to this range, which traverses the peninsula in the direction of its length, lying so much nearer the east than the west coast, the streams to the east of it have a short course and little volume, being, in fact, mere mountain torrents; while on the west side a few of the rivers are of considerable size. Of the latter, the Tiber (q. v.) is the largest. The eastern coast is bold and rugged, and destitute of proper harbours, that of Ancona alone excepted; towards the north, at the mouth of the Po, it gradually subsides into a low, level, marshy tract, with numerous lagoons. The country west of the Apennines is traversed by ranges of hills parallel to them, and gradually decreasing in elevation as they approach the sea. The coast itself is almost wholly flat, sandy, or marshy, with no deep bays and few good harbours besides Civita Vecchia. There are numerous small lakes, principally in the northern portion of the country, the chief of which are Lake Bolsena, Lake Perugia, and Lake Bracciano, the last an old crater, situated almost 1000 feet above sea-level.

The country was divided for administrative purposes into 20 districts, as follows: 1 Comarca, including Rome and the Agro Romano; 6 Legations, Bologna, Ferrara, Forlì, Ravenna, Urbino, Velletri; and 13 Delegations, Ancona, Ascoli, Benevento, Camerino, Civita Vecchia, Fermo, Frosinone, Macerata, Orvieto, Perugia, Spoleto, Rieti, Viterbo; with a total area of 15,774 English square miles, and a population (1853) of 3,124,668. The Legations of Bologna, Ferrara, Forlì, and Ravenna constituted the *Romagna*; Spoleto and Perugia were known as *Umbria*; and Ancona, Fermo, Macerata, and Ascoli constituted the *March of Ancona*. The inhabitants, with the exception of 16,000 Jews, are of Italian race, and of the Roman Catholic religion. The only provinces now remaining under the papal rule are, Rome with the Comarca, the legation of Velletri, and the delegations of Civita Vecchia, Frosinone (excepting Pontecorvo), and Viterbo, with a total area of 4493 English square miles, and a population of about 700,000. The chief cities and towns in the present territory are, Rome (the capital), Viterbo, Velletri, Alatri, and Civita Vecchia.

Climate and Products.—The climate of the P. S. is one of the finest in the world, and the heat of summer is tempered by the mild and cooling sea-breezes; but in the flats south of the Po and in the Campagna of Rome, the noxious atmosphere produced by the exhalations from the marshes is most destructive of human life. Fever and ague are very prevalent among the inhabitants of the neighbouring districts, and notwithstanding the attempts to remedy the deadly influence of the marshes by drainage and cultivation, it has hitherto been undiminished (see **MAREMME**). Violent siroccos are occasionally experienced on the west coast. The northern portion, from its elevation, is exposed to severe cold during winter. The soil of the P. S. is in general extremely fertile; but the higher mountain districts are either quite barren, or only adapted for pasture; and not more than one-third of the whole surface is under cultivation. The practice of agriculture is in its most primitive state, notwithstanding the fact that agriculture, as a science, originated here, and was practised for many centuries before it was introduced into the other countries of Europe; but the many political changes and revolutions which have convulsed the country, have acted as a bar to all

PAPAL STATES.

enterprise. It must, however, be mentioned, that the present pope has, by salutary enactments, and by the establishment of agricultural societies, done much for the improvement of this branch of industry. The products are similar to those of the rest of Italy. The manufactures are comparatively unimportant—silks, woollens, and leather are the chief; but plate-glass, rope, sailcloth, cotton goods, paper, artificial flowers, wax-candles, soap, stoneware, &c., are also manufactured in various places. The fisheries are important. The chief minerals are alum, vitriol, saltpetre, sulphur, coal, rock-salt, marble, and alabaster.

Many of the manufactured goods, and wine, olive oil, wool, hemp, tobacco, bread-stuffs, catgut, &c., are exported, the total exports (1858) amounting to 11,690,258 scudi (£2,528,100); while the imports for the same year reached the value of 13,510,143 scudi (£2,921,662): since this date no reliable statistics of the trade of the districts still remaining under the pontifical rule have been received.

Government.—The pope possesses absolute and unlimited power, but the members of the college of cardinals, who elect him, generally keep the chief offices of state in their own hands, and assist the pope in the government of his states, as well as in the affairs of the church. The secretary of state is at the head of political affairs, and is nominated by the pope. He presides over both the ministerial council and the council of state. The former council, which consists of five or more ministers, heads of departments, selected by the pope, has a voice in legislation, and also the right of authoritative interpretation of the laws; the latter, which consists of thirteen members, also nominated by the pope, has, in matters of legislation and finance, only the right of giving advice; but it settles any question of competency that may arise between the various branches of the administration. Since 1850, there has also been a separate *finanza-consulta* for the regulation of financial affairs. The Comarca, which is more directly under the central government, is ruled by a cardinal-president; the Legation is ruled by a cardinal-legate, aided by a provincial chamber of deputies. There are civil and criminal courts in all the provinces, minor courts in the communes, with courts of appeal in all the chief cities, and a central tribunal at Rome. All the proceedings of these courts are public, except trials for political offences. There are loud complaints of abuses in all departments of the administration. Ecclesiastically, the country is divided into archbishoprics and bishoprics.

The papal army, which formerly amounted to 20,000 men, now (June 1863) numbers only 8513 men, infantry, cavalry, artillery, &c. included, and a considerable portion of the present papal territory is garrisoned by French troops, without whose aid the pope's power could not be maintained.

The income and expenditure for 1859, the last year of the entirety of the P. S., were respectively 14,453,325 scudi (£3,126,028), and 15,019,346 scudi (£3,248,038); but the three succeeding years shewed a widely different result; the expenses being largely increased by the cost of the war, while from the rebellious provinces scarcely any taxes were collected. The income and expenditure for these three years were nearly as follows:

	Expenditure.	Income.
1860	\$4,720,809	£1,716,668
1861	4,391,644	1,716,668
1862	2,145,822	1,072,911

The finances are still in the same deplorable condition, and the national debt amounts to about £17,000,000. The tax, known as 'Peter's pence,' which was lately collected from all the Roman

Catholic countries, had produced at the beginning of 1863 about £1,080,000.

History.—During the rule of the Goths and Lombards in Italy, the inhabitants of Rome and all who desired to live free from the barbarian yoke, feeling that the Greek empire was incapable of protecting them, and at the same time observing the pertinacity and energy with which the pope asserted the importance and dignity of Rome, naturally looked up to him as in some sort a protector; and it is to the gradual growth and spread of this feeling that the important position subsequently taken by the popes as authorities in temporal matters is chiefly due. About 720 A.D., Gregory III., having quarrelled with the Emperor Leo the Isaurian, declared the independence of Rome. In 726, Pepin le Bref compelled the Lombard king to hand over Ravenna, Rimini, Pesaro, Fano, Cesena, Urbino, Forlì, Comacchio and fifteen other towns, to the pope, who now assumed the state of a temporal sovereign. Pepin's example was followed by his son Charlemagne; but, notwithstanding, the pope's sovereignty was more nominal than real, as the towns were not in his possession, and he only obtained a small share of their revenues. In the 11th c., the Normans greatly aided to increase the papal temporal authority, and in 1053 the duchy of Benevento was annexed. In 1102, the Countess Matilda of Tuscany left to the pope her fiefs of Parma, Mantua, Modena, and Tuscany; but these were immediately seized by the German emperor, and of this magnificent bequest only a few estates came into the pope's hands. Between this period and the end of the 13th c., the popes succeeded, often by unscrupulous means, in obtaining from many of the free towns of Italy an acknowledgment of the superiority of the Roman see over them; and in 1278 the Emperor Rodolf I. confirmed the popes in the acquisitions thus obtained, defined authoritatively the boundaries of the P. S., and acknowledged the pope's exclusive authority over them, by absolving their inhabitants from their oath of allegiance to the empire. The P. S. at this time included Perugia, Bologna, Bertinoro, the Duchy of Spoleto, the Exarchy of Ravenna, and the March of Ancona; but many of the towns were either republics or hereditary principalities, and in none did the pope possess real authority. Sixtus IV., in the end of the 15th c., managed to annex the Romagna to his dominions; in effecting which he is accused of having employed intrigue, perjury, and murder. His successors, Alexander VI. and Julius II., increased the P. S. by the addition of Pesaro, Rimini, Faenza, Parma, Placentia, and Reggio. By the victory of the French at Marignano (1515), the very existence of the papal power was threatened; but the able policy of Leo X. averted the threatened danger. In 1545, Paul III. alienated Parma and Placentia, and erected them into a duchy for his son, Pietro Luigi Farnese; but this loss was partly made up by the acquisitions of Gregory XIII. In 1598, the possessions of the House of Este, viz., Ferrara, Comacchio, and a part of the Romagna, were seized by Pope Clement VIII.; and the P. S. received their final additions in Urbino (1623), Ronciglione, and the duchy of Castro (1650). The Romagna was seized by Napoleon in 1797, and incorporated in the Cisalpine Republic; and in the following year, Rome was taken by the French, and the P. S. erected into the *Roman Republic*. Pius VII., in 1800, obtained possession of his states, but they were almost immediately retaken by the French, and finally (1809) incorporated with France, Rome being reckoned the second city of the empire. In 1814, the pope returned to his dominions, and was formally reinstated by the treaty of Vienna, mainly

through the exertions of the non-Roman Catholic powers, Russia, Prussia, and Britain; but the clerical misgovernment contrasted so strongly with the liberal administration of France, that in 1830 the people of Ancona and Bologna rose in rebellion. They were put down by the aid of an Austrian army, but the abuses in the administration were so flagrant, that even Austria urged the necessity for reform. Her remonstrances, however, were not attended to, and the Bolognese again rebelled. This second revolt supplied Austria with a pretext for occupying the northern Legations, and the French at the same time garrisoned Ancona. Occasional risings took place from time to time up to 1846, when the present pope, Pius IX., assumed the tiara, and burst upon the astonished world in the new character of a reforming pope. His projects were of a most liberal character, and were put in force with great energy, despite the opposition of Austria; but, alarmed at the spread of revolution in Europe during 1848, he halted in his career, just at the critical moment when to halt was to be lost. The people rose, and Pius IX. fled to Gaeta, whilst Rome was proclaimed a republic. He was restored, and his subjects reduced to submission, by the arms of France, Austria, Naples, and Spain. The Austrians held the Legations in subjection to the pope's authority till 1859; the French still occupy Rome in his behalf. In July 1859, the four northern Legations (the Romagna), taking advantage of the withdrawal of the Austrian troops, quietly threw off the papal authority, and proclaimed their annexation to Sardinia, which was formally acknowledged by Victor Emmanuel in March 1860. The pope now raised a large body of troops, appointing Lamoricière, an eminent French general, to command them, for the purpose of resisting any further encroachments on his dominions; but the news of Garibaldi's success in Sicily and Naples produced revolt in the Legation of Urbino and in the Marche, the people proclaiming Victor Emmanuel. The Sardinians accordingly marched into the P. S., defeated Lamoricière in two encounters, and finally compelled him to retire into Ancona, where, after a siege of seven days, he was compelled to surrender with his whole army. The revolted provinces of Umbria, Urbino, and the Marche were immediately annexed to Sardinia; and the isolated provinces of Benevento and Pontecorvo (a part of Frosinone), which are situated within the kingdom of Naples, shared the same fate. The pope still refuses to recognise the validity of the transfer of his states.

PAPAVERACEÆ, a natural order of exogenous plants, herbaceous or half shrubby, usually with a milky or coloured juice. The leaves are alternate, without stipules; the flowers on long one-flowered stalks. The fruit is pod-shaped or capsular; the seeds numerous. The order is distinguished for narcotic properties. Opium (q. v.) is its most important product. The juice of *Celandine* (q. v.) is very acrid. A number of species are used in their native countries for medicinal purposes. The seeds yield fixed oil, which, with the exception of that obtained from *Argemone Mexicana*, is quite bland. See **POPPY**. The flowers of many species are large and showy, most frequently white or yellow, sometimes red. Several kinds of Poppy and *Eschscholtzia* are frequent in our gardens. There are in all about 130 known species, natives of all quarters of the world, and of tropical and temperate climates, but they abound most of all in Europe.

PAPAW (*Carica Papaya*), a South American tree of the natural order *Papayaceæ*—of which

order about 30 species are known—which has now been introduced into many tropical and subtropical countries. It grows to the height of 15–30 feet, with leaves only at the top, where also the fruit grows close to the stem. The leaves are 20–30 inches long. The fruit is of a green colour, very similar in appearance to a small melon, and with a somewhat similar flavour. It is eaten either raw or boiled. The seeds are round and black, and when chewed, have in a high degree the pungency of cresses. The powdered seeds and the juice of the unripe fruit are most powerful anthelmintics. A constituent of this juice is *Fibrin*, otherwise unknown in the vegetable kingdom, except in the Fungi. The milky juice of the tree is very acrid. The leaves are used by negroes instead of soap to wash linen. The juice of the fruit and the sap of the tree have the singular property of rendering the toughest meat tender in a short time. Even

Papaw Tree (*Carica Papaya*).

the exhalations from the tree have this property; and joints of meat, fowls, &c., are hung among its branches to prepare them for the table. It is a tree of extremely rapid growth, bears fruit all the year, and is exceedingly prolific. The fruit is often cooked in various ways.—The *Chambrun* (*C. digitata*), another species of the same genus, a native of Brazil, is remarkable for the extremely acrid and poisonous character of its juice, and the disgusting stercoraceous odour of its flowers.—In the middle and southern states of America the name *P.* is given to the *Uvaria* (or *Asimina*) *triloba*, a small tree of the natural order *Anonaceæ*, the fruit of which, a large oval berry, three inches long, is eaten by negroes, but not generally relished by others. All parts of the plant have a rank smell.

PAPENBURG, a small town of Hanover, in the bailiwick of Osnabrück, on a canal navigable for sea-going vessels, 27 miles south-south-east of Emden on Dollart Bay, by the Emden and Hanover Railway. It originated in a small colony which sprung up here, and was supported principally by peat-cutting, an employment for which the fens and moors of the vicinity afford abundant facilities. The town is cleanly built, after the Dutch model; its houses stretch along the banks of the canal. It possesses 130 ships, and carries on manufactures of

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from its first introduction; for, as early as 1690, Nathaniel Bladen took out a patent for 'An engine method and mill, whereby hemp, flax, linnen, cotton, cordage, silke, woollen, and all sorts of materials' might be made into paper and paste-board; and from that time innumerable efforts have been made to prepare other materials than cotton and linen rags for the manufacture of paper. The following is a summary of the patents which have been taken out in Britain for making paper from various materials, with the dates, which will shew to those engaged in this investigation in what directions the inquiry has been previously conducted. The arrangement is alphabetical, and consequently not in the order of dates.

Materials.	Names of Inventors, and Dates of Patents.
Aloe Fibre, . . .	Berry, 1838; D'Harcourt, 1838; Small, 1838; May, 1852; Burke, 1855.
Asbestos, . . .	Maniure, 1853.
Bagging or Sacking, .	Stiff, 1853; Wheeler and Co., 1854; Rosister and Co., 1854; Smith and Co., 1855.
Banana Fibre, . . .	Berry, 1838; Lillie, 1854; Jullion, 1855; Burke, 1855; Hook, 1857.
Barks of various kinds,	Koop, 1800; Balmano, 1838; Nerot, 1846; Coupler, 1852; Johnson, 1855; Kelt, 1855; Lottati, 1855; Niven, 1856; Broad, 1857; Hope and Co., 1857.
Bass or Bast, . . .	Ruck and Touche, 1856; Touche, 1857.
Bean-stalks, &c., . .	D'Harcourt, 1838; Brooman, 1855.
Cane (Sugar), . . .	Berry, 1838; Coupler, 1852; Johnson, 1855; Jullion, 1855; Ruck and Touche, 1856; Hook, 1857.
Cocoa-nut Fibre, . .	Newton, 1852; Holt and Forster, 1854.
Cocoa-nut Kernel, . .	Diaper, 1854.
Clover, . . .	Coupland, 1854; Holt and Fraser, 1854; Plunkett, 1857.
Cotton, . . .	Bladen, 1692; Williams, 1833; Coupler, 1852; Crossley, 1854; Siblet, 1857.
Dung, . . .	Jones, 1805; Zander, 1839; Lloyd, 1852; Hill, 1854.
Esparto or Alfa, . .	Routledge, 1856.
Flax, . . .	Bladen, 1692; Koops, 1800; Jones, 1805; Ball, 1817; Berry, 1838; Gibbs, 1833; De la Garde, 1825; Coupler, 1852; Collina, 1853; Pownall, 1852; Coupland, 1854; Broad, 1857.
Flax, New Zealand, .	Berry, 1838; Gibbs, 1833 and 1857; Gillman, 1854.
Fresh-water Weeds, .	Archer, 1855.
Fur, . . .	Williams, 1833.
Grasses, . . .	Stiff, 1853; Evans, 1854; Cliff, 1854; Coupland, 1854; Jeyes, 1854; Crossley, 1854; Jackson, 1854; Johnson, 1855; Fraser, 1855; Gibbs, 1853; Holt and Fraser, 1854; Pariset, 1856.
Gutta-percha, . . .	Hancock, 1846.
Hair, . . .	Williams, 1833.
Hay, . . .	Koops, 1800; Castelain, 1854; Pariset, 1856.
Heath, . . .	Crossley, 1854.
Hemp, . . .	Bladen, 1692; Hooper, 1790; Koops, 1800; De la Garde, 1825; Gibbs, 1832; Coupler, 1852; Collina, 1853; Bargnano, 1853; Jackson, 1854; Hill, 1854; Broad, 1857; Ball, 1817.
Hops, . . .	De la Garde, 1825; D'Harcourt, 1838; Balmano, 1838; M'Guaran, 1839; Sheldon, 1843; Barling, 1851; Crossley, 1854; Holt and Fraser, 1854; Taylor, 1854; Broad, 1857; Plunkett, 1857.
Husks of Grain, . .	Wilkinson, 1852.
Jute, . . .	Calvert, 1846; Nerot, 1846; Coupler, 1852; Helin, 1854; Jackson, 1854; Smith and Hollingworth, 1855.
Leather, . . .	Hooper, 1790; Trappes, 1854; Oeka, 1856; Van den Hout, 1856; Lichtenstadt, 1857.
Leaves, . . .	Balmano, 1838; Warner, 1853; Vivien, 1853; Johnson, 1855; Moll, 1855; Ruck and Touche, 1857.

Materials.	Names of Inventors, and Dates of Patents.
Malze, Huak, and Stems,	D'Harcourt, 1838; Balmano, 1838; Ruck and Touche, 1857.
Manilla Hemp or Plantain Fibre, . . .	Newton, 1852.
Moss, . . .	Nesbitt, 1824; Bellford, 1854; Johnson, 1855.
Nettles, . . .	Jones, 1805; De la Garde, 1825; Cliff, 1854.
Old Writing Paper, .	Koops, 1800.
Poa Stalk, . . .	D'Harcourt, 1838.
Peat or Turf, . . .	Ley, 1852; Clarke, 1853; Lalla-manda, 1853; Crossley, 1854; Hemming, 1857; Westerman, 1852.
Roots of various kinds,	Balmano, 1838; De la Bertche, 1855; Johnson, 1855; Ackland, 1854; Barling, 1855; Dubus, 1857.
Sawdust, . . .	Wilkinson, 1852; Johnson, 1855.
Sea-weeds, . . .	Martensol de Martono, 1855; Archer, 1855.
Silk, . . .	Bladen, 1692; Ball, 1817; Williams, 1833.
Straw, . . .	Koops, 1800; Lambert, 1834; Zander, 1839; Coupler, 1852; Stiff, 1853; Poole, 1853; Helin, 1854; Fraser, 1855; Chanchard, 1856; Castelain, 1854; Broad, 1857; Wheeler, 1857.
Tan (Spent Bark), .	Crossley, 1854; Jeyes, 1854; Hill and Forster, 1854; Horton, 1855; Rosister and Bishop, 1854.
Thistle-down, . . .	Bellford, 1854.
Thistles, . . .	Koops, 1800; Lord Berridale, 1854; Lillie, 1854.
Tobacco-stalks, . .	Adcock, 1854.
Wood, . . .	Koops, 1801; Deegrand, 1839; Brooman, 1853; Swindella, 1854; Newton, 1852; Johnson, 1855; Kelt, 1855; Martin, 1855; Pottelval, 1855; De Frontur, 1855; Chanchard, 1856; Amyot, 1856; Newton (Voelter), 1857; Pousa, 1857; Coupler, 1852.
Wool, . . .	Bladen, 1692; Williams, 1833; Dickenson, 1807; Crossley, 1854.
Wrack Grass or Zostera,	Spooner, 1857.

But whatever the material employed, the process for nearly all is the same. The rags, bark, fibres, or other substance, have to be reduced with water into a fine smooth pulp. This, in the early stages of the manufacture, was accomplished by macerating and boiling the material, until, in the case of bark, fibres, or other raw material, the fibres could be drawn out from the cellulose matter, after which it was beaten with mallets, or with pestles in mortars, or stampers moved by some power. Water is generally used, but in Holland wind-mills do this work. The beating is continued until the material is reduced to a very smooth pulp. The pulping, in our machine paper-mills, is much more rapidly accomplished by boiling the linen or cotton rags, or other material, in a strong lye of caustic alkali. This effectually cleans the rags, and other vegetable fibres

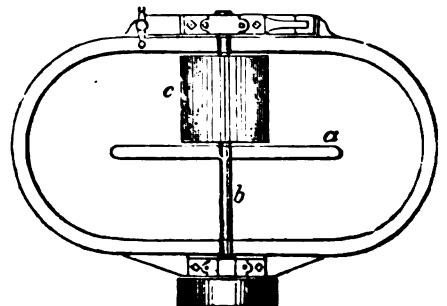


Fig. 1.

are softened and separated in a remarkable manner by it; they are then put into a machine called the washing-machine (fig. 1), which washes out dirt

face of the sheet of pulp to a piece of felt or flannel cloth stretched on a board, called the *couch*, and the sheet thus pressed, leaves the mould, and is left on the *couch*. Every successive sheet is similarly treated, and they are piled one on another, with a sheet of felt between each, until from four to eight quires, or a *post*, as it is called, is formed. Each post is put in a press, and under pressure parts with nearly all the moisture in the sheets of paper. The felts are then removed, and after several pressings, and other minor operations, the paper is hung on hair ropes, called *tribbles*, in the drying-loft; and when dried, resembles blotting-paper, and cannot be written upon. This is remedied by dipping it in a weak solution of hot size, sometimes tinged with colour, after which it is pressed, dried, folded, and made up into quires. Hot pressing and glazing are done by passing the sheets through hot and polished iron rollers.

In Britain very little paper is now made by hand, the wonderful paper-machine having entirely changed the character of the manufacture. It is usually stated that Louis Robert, a Frenchman, invented the paper-machine, and that it was brought to this country by Didot of Paris in an imperfect state, but received improvements from Fourdrinier. This ingenious manufacturer certainly did very much to make the paper-machine useful and perfect, but it must not be overlooked that Bramah took out a previous patent in 1805, rather more than a year before Fourdrinier, for very similar improvements to those described in Fourdrinier's specification. The object of all was to cause an equal and well-regulated supply of the pulp to flow upon an endless wire-gauze apron, which would revolve and carry on the paper until it is received on an endless sheet of felt, passing around and between large couching cylinders. These machines have now been brought to such perfection, that paper can be made in one continuous web of any length; and before leaving the machine, is dried, calendered, hot pressed, and cut into sheets. Different engineers have varied the construction of the paper-machine, but the general principles of all are the same. We therefore select for illustration the machine which was exhibited by Mr George Bertram of Edinburgh, and which was universally acknowledged to be by far the most complete and perfect which was presented in the International Exhibition of 1862.

Fig. 6 is a side view of the machine, and fig. 7 a vertical one. The principle of the machine is very simple; it contains a pulp vat, A (figs. 6 and 7), with a hog or wheel inside to agitate the pulp, and an arrangement for pouring the pulp over the wire-gauze mould, B, B, B, B, which instead of being in single squares, as in the hand-process, is an endless sheet moving round two rollers, *a*, *b*, which keep it stretched out and revolving when in operation. Under the part which receives the pulp there is a series of small brass rollers, *d* (fig. 6), these, being nearly close together, keep it perfectly level, which is a most necessary condition; besides which, there is a shallow trough, *ee* (fig. 6), called the *save all*, which catches and retains the water, which always escapes with some pulp in suspension; and an arrangement of suction boxes and tubes, *f, f, f* (fig. 6), worked by air-pumps, which draw much of the water out as the pulp passes over them. The pulp is kept from running over the sides by straps called the *deckles*, which are also endless bands, usually of vulcanised India-rubber, carried round moving rollers, so that they travel with the wire-gauze, and therefore offer no resistance to it. In addition to all this, the framework on which the surface of the wire-gauze rests

has a shogging motion, or side-shake, which has an important effect in working the fibres together before the pulp finally settles down. When it reaches the *couching-rolls*, which press out most of the remaining moisture, and carry it forward to the first and second series of press-rolls by means of an endless web of felt which passes round them, the speed of these rollers and the travelling sheet of felt, CC (figs. 6 and 7), is nicely calculated, so as to prevent a strain upon the still very tender web of paper. Sometimes the upper rollers of these two series are filled with steam, in order to commence drying the web. The paper is now trusted to itself, and passes on, as indicated by the arrows, from the second press-rolls to the first set of *drying cylinders*, DD (figs. 6 and 7), where it again meets with a felt sheet, which keeps it in close contact with the drying cylinders, which are of large size, and filled with steam. Around these it passes, drying as it goes; is then received between the two *smoothing-rolls*, or damp calenders, which press both surfaces, and remove the marks of the wire and felt, which are until then visible on the paper. This is necessarily done before the drying is quite completed; and from the smoothing-rolls it passes to the second series of drying cylinders, E (figs. 6 and 7), where the drying is finished, and thence to the calenders, which are polished rollers of hard cast-iron, so adjusted as to give a considerable pressure to the paper, and at the same time a glossiness of surface. For writing-papers, the paper passes through a shallow trough of size after leaving the drying cylinders, and

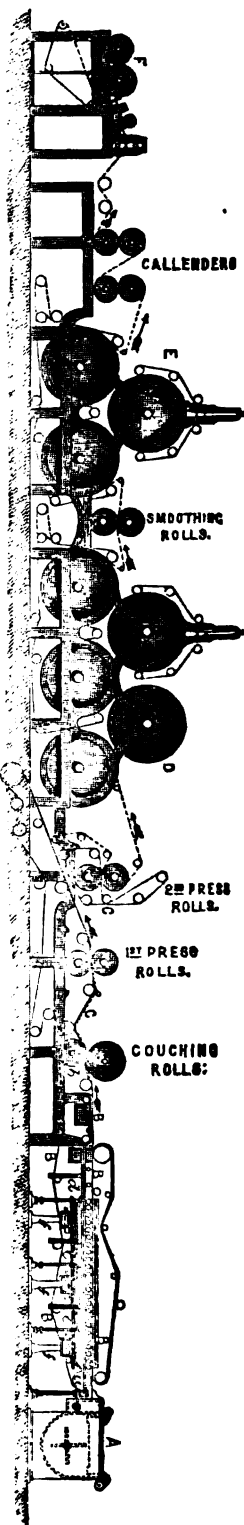


Fig. 6.

rag, notwithstanding the foreign impediments, have been also very large during the last eight years. They are as follows: 1856, 10,287 tons; 1857, 12,206 tons; 1858, 11,394 tons; 1859, 14,261 tons; 1860, 16,145 tons; 1861, 20,846 tons; 1862, 23,943 tons; and 1863, 45,448 tons. Judging from good data, this manufacture has more than doubled since the abolition of the paper-duty, at which time it was very nearly 100,000 tons—a quantity so vast, that it will remove all surprise at the difficulty of supplying the raw materials.

The following are the principal varieties of ordinary paper, and the sizes of the sheets given in inches:

1. *Writing and Printing Papers*.—*Pot* (so named from its original water-mark, a tankard), 12½ by 15; *Double Pot*, 15 by 25. *Foolscap*, 16½ by 13½; *Sheet-and-third Do.*, 22½ by 13½; *Sheet-and-half Do.*, 22½ by 13½; *Double Do.*, 27 by 17. *Post* (so called from its use in letter-writing; one of its original water-marks was a postman's horn), 18½ by 15½; *Large Do.*, 20½ by 16½; *Medium Do.*, 18 by 22½; *Double Do.*, 30½ by 19. *Copy*, 20 by 16½. *Double Crown*, 20 by 30. *Demy*, 20 by 15; *Printing Do.*, 22½ by 17½; *Medium Do.*, 22 by 17½; *Medium Printing Do.*, 23 by 18½. *Royal*, 24 by 19; *Printing Do.*, 25 by 20; *Super-royal*, 27 by 19; *Super-royal Printing*, 21 by 27. *Imperial*, 30 by 22. *Atlas*, 34 by 26. *Columbier*, 34½ by 23. *Elephant*, 28 by 23; *Double Do.*, 26½ by 40. *Antiquarian*, 53 by 31: this is generally, if not always, hand-made.

These sizes are somewhat lessened by ploughing and finishing off the edges previous to sale.

2. *Coarse Papers for wrapping and other purposes*.—*Kent-cap*, 21 by 18; *Bag-cap*, 19½ by 24; *Havon-cap*, 21 by 16; *Imperial-cap*, 22½ by 29. *Double 2-lb.*, 17 by 24; *Double 4-lb.*, 21 by 31; *Double 6-lb.*, 19 by 28. *Cartridge*, *Casing*, and *Middle-hand*, &c., 21 by 16. *Lumber-hand*, 19½ by 22½; *Royal-hand*, 20 by 25; *Double Small-hand*, 19 by 29.

Purple papers of a soft texture, unsized, are used in very large quantities by sugar-refiners, of the following sizes: *Copy-loaf*, 16½ by 21½; *Powder-loaf*, 18 by 26; *Double-loaf*, 16½ by 23; *Single-loaf*, 21½ by 27; *Lump*, 23 by 33; *Hambro*, 16½ by 23; *Tiller*, 29 by 35; *Prussian*, or *Double Lump*, 32 by 42.

Blotting and Filtering Paper.—This is unsized paper, made of good quality, and usually coloured pink or red, and of the same size as demy.

Besides these, which are well-known trade definitions, there are very many others, amounting, if we include *paste* and *mill boards*, to at least twelve or fifteen hundred, so that even paper-manufacturers require the aid of a treatise upon the subject of the sizes, qualities, &c., and such a treatise is in common use.

Even as regards materials, varieties are endless. In an old German book by Jacob Christian Schaffers, published at Regensburg in 1772, there are no less than eighty-one samples of different kinds of paper bound up and forming part of the book, and innumerable others have been made since.

Rice paper is a beautiful material imported from China, about which numberless errors have been written. It is now known to be formed of thin slices of the pith of the plant called *Aralia papyrifera*. This pith can be obtained from the stems in beautiful cylinders, from one to two inches in diameter, and several inches in length. The Chinese workmen apply the blade of a sharp, straight knife to these cylinders of pith, and, turning them round dexterously, pare them from the circumference to the centre, making a rolled layer of equal thickness throughout. This is unrolled, and

weights are placed upon it until it is rendered perfectly smooth and flat. Sometimes a number are joined together to increase the size of the sheets. It will be seen that this more nearly resembles the ancient papyrus than modern paper; but it is more beautiful than the former, being a very pure pearly white, and admirably adapted to the peculiar style of painting of the Chinese.

The ordinary papers of the Chinese, Japanese, and East Indians have much resemblance to each other, which arises from the manufacture and material being similar; the bark of the paper mulberry (*Broussonetia papyrifera*) being chiefly used. The Chinese and Japanese are the most skillful paper-makers in the world, and some of the East Indian papers surpass the European manufactures completely.

Some useful kinds of paper are the result of manipulations subsequent to the paper-maker's work. Thus:

Lithographic Paper is prepared from good printing-paper by laying on one side of the sheets a preparation consisting of six parts of starch, one of alum, and two of gum-arabic dissolved in warm water, and applied whilst hot with a proper brush. Generally a little gamboge is added, to give it a slight yellow colour.

Copying Paper, for manifold-writers, is made by applying a composition of lard and black-lead to one side or both of sheets of writing-paper; and after leaving it on for a day or so, it is carefully and smoothly scraped off and wiped with a soft cloth.

Tracing Paper is good printing-paper rendered transparent by brushing it over with a mixture of Canada balsam and oil of turpentine, or nut oil and turpentine. In either case it must be carefully dried before using.

There are two distinct classes of coloured papers. In one, the colour is introduced into the pulp, and is consequently in the body of the paper; in the other, the colours are mixed with size, and applied to the surface. There have been many ingenious and tasteful inventions for decorating the surface of paper, such as by giving it a marbled and even a beautiful iridescent appearance, but they are too numerous for the limits of this article.

Paper is subject to much adulteration. China-clay and gypsum are generally used for the white sorts, and the heavy ferruginous ochres for the coarse and brown kinds.

PAPER-BOOK, in English Law, is the name given to the pleadings on both sides in an action at law, when the issue is one, not of fact, but of law.

PAPER-HANGINGS. This name is applied to the webs of paper, *papiers peints* of the French, usually decorated, with which interior walls are often covered. Previous to the invention of the paper-machine, sheets of paper of the size called *Elephant*, 22 by 32 inches, were pasted together, to make 12 yard lengths, before the pattern was imprinted; but this is now rendered unnecessary by the facility of making webs of any length. Upon the paper it is usual first to spread a ground-colour, with proper brushes, taking care to produce a perfectly smooth surface. The colours employed are opaque, and are mixed with size, and sometimes also with starch, and most of the ordinary pigments are used. In the early stages of the art, it was usual to have the patterns stencilled (see **STENCILLING**) on the ground-colour. The stencilling plates were usually pieces of pasteboard, one being required for every differently-coloured portion of the pattern. Afterwards, wooden blocks were adopted, similar to those used in calico-printing made of pear or poplar wood, generally the width of the paper,

forming, indeed, huge woodcuts, on which the pattern is in high relief. As many blocks are required as there are colours in the pattern, each bearing only so much of the pattern as is represented by the colour to which it is assigned. Of course, the whole beauty of the work depends upon the nice adjustment of one portion of the pattern to another; and this is determined by guide-pins in the blocks, which are so managed as not to disfigure the surface with their points. The pattern-block, being coated with its particular colour from the colour-tub, is laid on the paper, which is stretched out for the purpose on a table, and a lever is brought to bear upon it with sufficient pressure to make the whole of the block bear equally upon the paper. When one block has been printed the whole length of the paper by a succession of impressions, the piece is taken to the drying-room, and dried, previous to receiving the next colour; and it often happens that the same operations have to be repeated a dozen different times before the pattern is completed. This process is now being rapidly superseded by the cylinder printing-machines, which are of the same kind as are used in printing textile fabrics. In these machines, the pattern is engraved on a series of copper cylinders, and each part or colour has a separate cylinder, and an arrangement for keeping it constantly supplied with colour when working. The cylinders are so arranged as, by the sum of their revolutions, to make the pattern complete; so that as the web of paper passes the first, it receives the colour for one portion of the pattern, and reaches the second in exact time to have the next colour applied in the right places. In this way the entire piece only occupies a few seconds in receiving the complete decoration.

The polished or glazed papers have the ground prepared with gypsum or plaster of Paris, and the surface dusted with finely-powdered steatite, or French chalk. When perfectly dry, this is rubbed hard with a burnishing-brush, until the whole is evenly polished. This is generally done before the pattern is printed, but in some cases pattern and ground are both polished. In making the *flock-papers*, the printing is done in the same way as in the block-printing, only, instead of coloured material, a composition called *encaustic* is printed on. It consists of linseed-oil, boiled with litharge, and ground up with white-lead; sufficient litharge is used to make it dry quickly, as it is very adhesive. The flock is prepared from the shearings of woollen cloths from the cloth-mills, by washing and dyeing the shearings to the various colours, then stove-drying and grinding them in a peculiar mill, which, in their brittle state, after leaving the stove, breaks them short. After this they are sifted, to obtain various degrees of fineness. By nice management, the prepared flock is so sprinkled over the whole of the printed surface as to coat the encaustic, and adhere evenly and firmly to it. The same adhesive material is used for printing in gold and other metals. The pattern being printed with the encaustic, gold or other metallic leaf is applied, and when it is properly fixed, the loose metal is brushed away with a hare-foot or other soft brush. Some of the finest French papers have much of the pattern actually painted in by hand, a process which, of course, renders them very costly.

PAPER MULBERRY. See MULBERRY.

PAPER NAUTILUS. See ARGONAUT.

PAPHLAGONIA, anciently a province of Asia Minor, extending along the southern shores of the Black Sea, from the Halys on the east, to the Parthians on the west (which separates it from Bithynia),

and inland on the south to Galatia. Its limits, however, were somewhat different at different times. The Paphlagonian mountains were covered with forests, and the inhabitants were famous as hunters. Croesus made P. a part of the kingdom of Lydia, and Cyrus united it to Persia; it subsequently became part of the empire of Alexander the Great, and afterwards of the kingdom of Pontus, was included in the Roman province of Galatia, and in the 4th c. of the Christian era was made a separate province by Constantine. Its capital was Sinope. The Paphlagonians are supposed to have been of Syrian, or at least of Semitic origin, like the Cappadocians. They were proverbially rude, coarse, and deficient in understanding, but this probably refers only to the country-people in the interior.

PAPHOS, anciently the name of two cities in the isle of Cyprus. The older city, sometimes called *Palaipaphos* (now *Kuklos* or *Konuklia*), was situated in the western part of the island, about 1½ miles from the coast. It was probably founded by the Phœnicians, and was famous, even before Homer's time, for a temple of Venus, who was said to have here risen from the sea close by, whence her epithet *Aphrodite*, 'foam-sprung,' and who was designated the Paphian goddess. This was her chief residence, and hither crowds of pilgrims used to come in ancient times.—The other Paphos, called *Neopaphos* (now *Bafu*), was on the sea-coast, about seven or eight miles north-west of the older city, and was the place in which the apostle Paul proclaimed the gospel before the proconsul Sergius.

PAP'IAS, Bishop of Hierapolis in Phrygia, was a Christian writer, who flourished in the 2d century. According to Irenæus, he was a disciple of the apostle John; but Eusebius, who quotes (*Historia Ecclesiastica*, chap. 39) the words of Irenæus, immediately subjoins a passage from P. himself, in which the latter distinctly states that he did not receive his doctrines from any of the apostles, but from the 'living voice' of such followers of theirs as 'are still surviving.' He was, however, an 'associate' of Polycarp, a bishop in the same province of proconsular Asia; and as the latter was a disciple of the apostle John, it is probable that Irenæus—a somewhat hasty writer—inferred that his companion must have been the same. The *Paschal* or *Alexandrian Chronicle* states that he suffered martyrdom at Pergamus, 163 A.D. Eusebius describes P. as 'well skilled in all manner of learning, and well acquainted with the Scriptures; but a little further on, he speaks of him as a man 'of limited understanding' (*emikrōs en tōn noōn*), and a very credulous chronicler of 'unwritten tradition,' who had collected 'certain strange parables of our Lord and of his doctrine, and some other matters rather too fabulous.' The work in which these were contained was entitled *Logiōn Kuriaōn, Exegeteis Bibliai E'*. (Five Books of Commentaries on the Sayings of our Lord). It is now lost, but certain fragments of it have been preserved by Irenæus, Eusebius, Maximus Confessor, and other writers. These fragments are extremely interesting, because of the light which they throw on the origin of the New Testament Scriptures, and their importance may be estimated from the fact, that they contain the earliest information which we possess on the subject. It is P. who is our authority for the statement, that the evangelist Matthew drew up a collection of our Lord's sayings and doings (*ta logia*) in the Hebrew (probably Syro-Chaldaic or Aramaic) dialect, and that every one translated it as he was able. There can be no doubt that this is a perplexing statement, suggesting as it does the delicate question: 'If Papias is correct, who wrote our present Matthew, which is in Greek,

and not in Hebrew?' (For a consideration of this point, see MATTHEW.) P. also tells us, either on the authority of John the Presbyter, or more probably on that of one of his followers, that the evangelist Mark was the interpreter (Hermeneutes) of Peter, and wrote 'whatsoever he [Peter] recorded, with great accuracy.' But the passage is far from implying that Mark was a mere amanuensis of Peter, as some have asserted, but only, as Valesius has shewn, that Mark listened attentively to Peter's preaching, culled from it such things as most strictly concerned Christ, and so drew up his gospel. P., it remains to be said, was an extreme millennarian. See MILLENNIUM.

PAPIER-MÂCHÉ (Fr. mashed or pulped paper). This manufacture has certainly been in use for more than a century in Europe; but it is not improbable that it was first suggested by some of the beautiful productions of Sindh and other parts of India, where it is employed in making boxes, trays, &c., as well as in China and Japan. Its first application, as far as we know, was to the manufacture of snuff-boxes by a German named Martin, in 1740, who learned it of a Frenchman named Lefevre; but the French say that he learned the art in England. Properly speaking, papier-mâché is paper-pulp moulded into shape, and it has been used, not only to make small articles, such as boxes, trays, &c., but in the interior decoration of houses for cornices, ceilings, &c. The ceilings in Chesterfield House, and some other fine Elizabethan structures, are made of this material, which at one time, owing to a combination of the stucco-workers to raise the price of their labour, took the place almost entirely of stucco in house ornamentation. At present, a combination of both stucco and paper is similarly employed under the name of *Carton-pierre*. From the extension of the applications of papier-mâché to the manufacture of a number of light and useful articles, modifications have taken place in its composition, and it is now of three kinds—1st, the true kind, made of paper-pulp; 2d, sheets of paper pasted together after the manner of pasteboard, but submitted to far greater pressure; and 3d, sheets of thick millboard cast from the pulp are also heavily pressed. The term papier-mâché is in trade held to apply rather to the articles made of the pulp than to the pulp itself; and a vast manufacture has sprung up during the present century, particularly in Birmingham, in which a great variety of articles of use and ornament are made of this material. They are coated with successive layers of asphalt varnish, which is acted upon by heat in ovens until its volatile parts are dissipated, and it becomes hard, and capable of receiving a high polish. Mother-of-pearl is much used in their decoration, for which purpose, when several layers of the varnish still remain to be applied, thin flakes of the shell of the form of the pattern are placed on the varnish, and are covered by the succeeding layers, giving rise to elevations where they are hidden by the coats of varnish. The surface is then ground down smooth and polished, and the grinding down brings to light the pieces of mother-of-pearl shell, which thus present the appearance of inlaid patterns. The fine surface which can be given to the asphalt varnish, also permits of burnished gilding and other decorative applications with excellent effect.

PAPILIO. See BUTTERFLY.

PAPILIONACEÆ, a suborder of the natural order of plants generally called *Leguminosæ* (q. v.).—The plants of this suborder are the only plants known which have flowers of the peculiar structure called *papilionaceous*, and of which the Pea and

Bean afford familiar examples. The name is derived from Lat. *papilio*, a butterfly. Papilionaceous flowers have five petals, imbricated in estivation (bud), one of which, called the *vevillum*, or *standard*, is superior, turned next to the axis, and in estivation folded over the rest; two, called the *ale*, or *wings*, are lateral; and two are inferior, which are often united by their lower margins, forming the *carina*, or *keel*. The number of the P. is very great—about 4800 species being known. They are found in all parts of the world, abounding in the tropics. Many have superb and beautiful flowers; many are plants of beautiful form and foliage, trees, shrubs, or herbaceous plants; many possess valuable medicinal properties; and many are of great importance as furnishing food for man and for domestic animals, others as furnishing dyes, fibre, timber, &c. See BROOM, LABURNUM, CLOVER, BEAN, PEA, LUCERNE, LIQUORICE, INDIGO, SANDAL-WOOD, &c.

PAPILLÆ. This term is applied by anatomists to minute, elongated, conical processes, projecting from the surface of the true skin into the epidermis, highly vascular and nervous in their character, and taking an active part in the sense of touch. Their form and structure are described in the article SKIN. The mucous membrane of the tongue also contains three varieties of papillæ, which are described in the article TASTE, ORGAN AND SENSE OF.

PAPIN, DENIS, a celebrated French physicist, was born at Blois, 22d August 1647, and studied medicine in Paris, where, after receiving his degree, he practised for some time as a physician. He now became acquainted with Huyghens—an incident which strengthened in him an original predilection for physical science; and from this time, he devoted himself almost exclusively to his favourite study. Before P.'s time, the intense force which can be generated in water, air, &c., under the action of heat, was well known, but he was one of the first to indicate the principal features of a machine by which this property could be made of practical utility. He soon acquired a wide reputation; and on visiting England, was received with open arms by the philosophers of that country, and became a member of the Royal Society in 1681. While in England, P. and Boyle (q. v.) together repeated their experiments on the properties of air, &c.; but in 1687, P. was called to the chair of Mathematics in the university of Marburg in Hesse-Cassel, the duties of which office he discharged with zeal and success for many years. He died at Marburg about 1714. The French Academy of Sciences, withholding from P. the honour of 'associate,' enrolled him among its 'correspondents'—a proceeding on the part of the Academy which has, with reason, excited the astonishment of F. Arago. To P. undoubtedly belongs the high honour of having first applied steam to produce motion by raising a piston; he combined with this the simplest means of producing a vacuum beneath the raised piston—viz., by condensation of aqueous vapour; he is also the inventor of the 'safety-valve,' an essential part of his 'Digester' (q. v.). By this latter machine, P. shewed that liquids in a vacuum can be put in a state of ebullition at a much lower temperature than when freely exposed to the air. P.'s sagacity led him to many other discoveries; he discovered the principle of action of the siphon, improved the pneumatic machine of Otto de Guericke (q. v.), and took part against Leibnitz in the discussion concerning 'living' and 'dead' forces. Unfortunately for science, P.'s numerous writings have not yet been collected, but many of them will be found in the *Philosophical Transactions*, *Acta Eruditorum*, and the *Recueil de Diverses Pièces*. He

published two works—one being an explanation of the construction and uses of his 'digester' (Lond. 1681), afterwards (1682) translated into French, and his experiments entitled *Nouvelles Expériences du Fide* (Paris, 1674). It was not till nearly a century after that the great value of P.'s discoveries was perceived.

PAPINIANUS, **ÆMILIUS PAULLUS**, the most celebrated of Roman jurists, was born towards the middle of the 2d c.; and during the reign of the Emperor Severus (q. v.), whom he succeeded as *Advocatus Fisci*, and whose second wife is said to have been P.'s relative, he held the office of *Libellorum Magister*, and afterwards that of *Præfectus Prætorio*. After the death of Severus, his son and successor, Caracalla, dismissed P. from his office, and soon afterwards caused him to be put to death on various pretexts, the real reason, however, appearing to be that the emperor was afraid the influence of a man so able and upright would be dangerous to his power. P.'s works consist chiefly of 37 books of *Quæstiones*, 19 of *Responsæ*, 2 of *Definitiones*, two works, *De Adulteriis*, and a Greek fragment; and from these works there are in all 595 excerpts in the Digest (q. v.). The pupils of P. include the most famous names in Roman jurisprudence, such as Ulpian, Paullus, Pomponius, Africanus, Florentinus, and Modestinus, but the master stands superior to them all. The high reputation he enjoyed among his contemporaries and successors may be gathered from the epithets *Prudentissimus*, *Consultissimus*, *Disertissimus*, bestowed upon him by various emperors, and from the first book of the *Codex Theodosii*, *De Responsis Prudentium*, in which, after declaring the works of P., Paullus, Cais, Ulpian, Modestinus, and four others, to be authority for a judge's decision, it is declared that should these jurists be equally divided in opinion, that opinion which was maintained by P. was to be considered right; while his commentator, the celebrated Cujacius (q. v.), goes so far as to declare 'that Papinianus was the first of all lawyers who have been, or are to be,' and that 'no one ever will equal him.' His high reputation as a jurist was much enhanced by the strong moral feeling and stern unbending honesty which were equally characteristic of him, and which have stamped his works with an ineffaceable impress. P.'s works were studied both before and after Justinian's time by Roman legal students of the third year, who were for this reason designated *Papinianistæ*. The fragments of P.'s works which now remain are somewhat obscure, and the excerpts from them in the Digest are in general so brief, that the aid of a commentator is required.

PAPIST (Lat. *papista*, an adherent of the pope) is a name applied, generally with some admixture of contempt, to members of the Roman Church. Of itself, it implies nothing more than that they are adherents of the pope; but in its popular use it includes all the distinctive doctrines of Roman Catholicism, and especially those which are supposed to be peculiarly cherished by the supporters of the papal authority. It is therefore in many cases held to be synonymous with the profession of the extreme opinions permitted in the Church of Rome, and even those which are popularly regarded as superstitious. Understood literally, no consistent Roman Catholic would disclaim it; but in the popular signification explained above, it is held to be offensive.

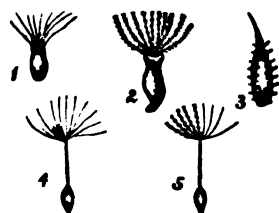
PAPPENHEIM, **GOTTFRIED HEINRICH**, COUNT ROY, an imperial general of great note in the Thirty Years' War, was born at Pappenheim, in Middle Franconia, Bavaria, 29th May 1594, of a very ancient Swabian family, in which the dignity

of Marshal of the Empire became hereditary about the 13th or 14th c., and many of whose members had greatly distinguished themselves in the wars of the middle ages. When about 20 years of age, P. went over to the Roman Catholic Church, and thenceforth signalled himself by his fiery zeal in its cause. After serving under the king of Poland in his wars with the Russians and Turks, P. joined the army of the Catholic League, and in the battle of Prague (1620) stayed the flight of the Austrian cavalry, and by a well-timed and furious charge turned the tide of battle against the Bohemians. In 1623, he received from the emperor the command of a cavalry regiment of the famous 'Pappenheimer Dragoons;' and in 1625, became general of the Spanish horse in Lombardy; but in 1626 re-entered the Austrian service, and after suppressing a dangerous revolt of the peasants of Upper Austria, in which 40,000 of the peasants perished, he joined the army which was opposed to the Protestant league, and, in association with Tilly, carried on many campaigns against the Danes, Swedes, and Saxons. It was P. who urged and induced Tilly to take Magdeburg by assault, and himself led and directed the attack. Moreover, it is he, rather than Tilly, who was to blame for the ferocious massacres which followed. His reckless bravery involved Tilly, against his will, in the disastrous battle of Breitenfeld; but to some extent he retrieved his character by his strenuous efforts to remedy the loss, and protect the retreat of the army. After Tilly's death, he was associated with Wallenstein, who detached him with eight regiments to protect Cologne, but on hearing of the advance of Gustavus, sent an urgent order for his return. P. arrived at Lützen at the moment when Wallenstein's army was on the point of being completely routed, and at the head of his cuirassiers, charged the left wing of the Swedes, throwing it into confusion, and almost changing the fortune of the battle by his extraordinary bravery. He was mortally wounded in the last charge, and died a few hours afterwards at Leipzig, November 7, 1632, with a smile on his countenance, after learning that Gustavus Adolphus had died before him. 'God be praised!' he said; 'I can go in peace, now that that mortal enemy of the Catholic faith has had to die before me.'

PAPPUS, in Botany, an appendage of the fruit of plants belonging to certain natural orders, of which the great natural order *Compositæ* is the chief.

It consists either of simple (figs. 1 and 4) or feathery (figs. 2 and 5) hairs, sessile or stalked, arising from the summit of the fruit, and is produced by a development of the tube and limb of the persistent calyx. Its object appears to be to waft the ripened seed to the new situation in which it is to grow. *Thistle-down* is the pappus of the thistle.—The pappus is sometimes represented by mere teeth or scales.

PAPPUS of Alexandria, one of the later Greek geometers, of whose history nothing is known; he is said by Suidas to have lived during the reign of Theodosius the Great, emperor of the East (379—395). Some writers are of opinion that he lived two centuries earlier, but the former is much the more probable opinion. The chief work of P.



Pappus:
1 and 2, sessile; 3, scale-like;
4 and 5, stalked.

is his *Mathematical Collections*, of which the last six, out of eight books, are extant. The *Collections*, as their name implies, are an assemblage into one book of scattered problems and theorems, the work of Apollonius, Archimedes, Euclid, Theodosius, &c., to which he has joined his own discoveries. The first two books are supposed (on insufficient grounds) to have treated of arithmetic and arithmetical problems, but only a small fragment of the second book is extant: the third book is a collection of problems, mostly of solid geometry: the fourth treats of curves other than the circle, according to the method of pure geometry: the fifth contains problems of maxima and minima: the sixth treats of the geometry of the sphere: the seventh, which is by far the most important to modern geometers, as it is almost the sole authority we possess on the subject of the history and methods of the Greek geometrical analysis, treats principally of analysis; it also contains the proposition now known as 'Guldinus' Theorem,' which was plagiarised from P. by Father Guldin: the eighth and last book treats of machines. P. was the author of several other works which are lost, excepting only a fragment of his *Commentary on Four Books of Ptolemy's Syntaxis*. P., as an independent investigator, enjoys a high reputation, and is considered by Des Cartes as one of the most excellent geometers of antiquity. Some of his problems have been looked upon with high interest by all succeeding geometers. The *Mathematical Collections* have been published in whole or part, at various periods, but the only complete editions are the two Latin versions, the first by Commandine (Pisa, 1588), and the second by Manolossius (Bologna, 1660), and the Greek edition of H. J. Eisenmann (Paris, 1824). The portion of the Greek text of the 2d book, which was wanting in Commandine's MS., was published (1688) in London by Dr Wallis.

PA'PUA, or NEW GUINEA, if we except Australia, the largest island on our globe, lies in the Australian Archipelago, in 0° 30'—10° 4' S. lat., and 131°—151° 30' E. long., and is about 1200 miles in length from the Cape of Good Hope on the north-west to South-East Cape. It is bounded on the S. by Torres Strait, W. by the Moluccas Sea, N. and N.E. by the Pacific Ocean. In outline P. is very irregular, the western part being nearly insulated by Geelvink Bay, entering from the north, and the Gulf of M'Clure from the west, whilst in the south it ends in a long and narrow peninsula of lofty mountains. A line passing through the island in 141° E. long. is over 300 miles; at the head of Geelvink Bay and the Gulf of M'Clure, not more than twenty. It is indented by numerous gulfs and bays, besides the two already mentioned. Geelvink Bay is 260 miles broad at its mouth, and trends inland 200 miles to within a short distance of the Bay of Lakahia, on the south-west coast. It receives the waters of many rivers, and is studded with islands, of which Jobi is the largest, being 66 miles in length from east to west, lofty, well wooded, and abounding in all sorts of tropical fruits and birds.

The principal capes are, South-East Cape, at the extreme east of the island; King William's Cape, Cape Rigny, Cape Bonpland, Cape Duperre; Cape D'Urville, on the north; the Cape of Good Hope, on the north-west; and Cape Van den Bosch, on the south-west.

Chief rivers are the Amberron or Rochussen, which has its source in the mountains of the interior, and flowing towards the north-west, falls, by many mouths, through an extensive alluvial delta, into Geelvink Bay; Aird's River, which flows into the Great Bight; the Oeta-Nata,

which, by three channels, enters the sea in 4° 30' S. lat., and 136° 30' E. long.; the Karoela, to the north of Cape Van den Bosch, which enters Kaurao Bay on the south-west side, in 3° 45' S. lat., and 133° 28' E. long, and is half a mile wide.

The island is mountainous, except certain tracts of swampy land which have been formed by the river deposits. The southern peninsula is a mountain range with peaks far surpassing those of Australia in altitude, Mount Owen Stanley being 13,205 feet; Obree, 10,200; Yule Mountain, 9700; and many others of the same range approaching similar elevations. Passing in a line towards the north-west, the chain appears at different distances from the north coast, rises to the west of Humboldt's Bay into the Cyclops, the highest peak of which is 7000 feet, leaves its impress on Geelvink Bay, in the lofty island of Jobi, and further to the west shoots up in the Arfak and Amberbakin ranges, mountains of upwards of 9000 feet in height. The south-west coast is chiefly composed of lofty limestone hills, rising in terraces towards the interior till they attain the snow-line, Genofa, to the north of Kaimani Bay, being 5000, the Charles Louis 8852, and the Snow Mountains 15,400 feet above the sea-level.

Along the south-west shore are many coral banks, and the mountains are chiefly composed of white limestone, sometimes approaching to crystallisation. At Argoeni Bay, and other parts of the interior, they are of a brownish-gray sandstone. In the island of Lakahia, the Netherlands Scientific Commission, in 1858, found blue clay mixed with kidneys of ironstone, several croppings out of coal, and also sandstone. Nothing, however, is accurately known either of the mineral or vegetable wealth of the interior, the hostile and retiring nature of the mountaineers having hitherto closed it to the naturalist. On the north coast, near Humboldt's Bay, the earth and clay are of a brownish-red colour, with blocks of quartz here and there imbedded in it, the mountains being schistose, with the crystals of mica very small and compact. It has been said that P. produces gold, but it is as yet unknown, and the natives possess no ornaments or tools, except of wood, stone, and bone, but what are brought to them from Ceram.

P. is everywhere clothed with the most luxuriant vegetation, cocoa-nut, betel, sago, banana, bread-fruit, orange, lemon, and other fruit trees lining the shores; while in the interior are abundance of fine timber trees, as the iron-wood, ebony, canary-wood, the wild nutmeg, and the masooi, the fragrant bark of which is a leading article of export from the south-west coast. In the districts of the Arfak and Amberbakin Mountains the sugar-cane, tobacco, and rice are cultivated. The flower-garlanded and fruit-bearing forests are filled with multitudes of the most beautiful birds, of which are various kinds of birds of paradise, the crown-pigeon, parrots, lorries, &c. Fish, of which upwards of 250 sorts have been enumerated, are plentiful, and are either speared or shot with the arrow, except at Humboldt's Bay, where they are caught with nets made from vegetable fibres, with large shells attached as sinkers. The larger animals are unknown, but wild swine, kangaroos, the koesi-koesi (a kind of wood-cat), are plentiful, as also a small kind of domesticated dog used in hunting.

The exports are masooi bark, trepang or béche-de-mer, tortoise-shell, pearls, nutmegs, birds of paradise, crown-pigeons, ebony, resin, slaves, &c., which are brought to the islands of Sirotta, Namatotte, and Adä, on the south-west coast, where they are bartered, to the traders from Ceram, for hatchets, rice, large beads, printed cottons, knives, earthenware,

iron pans, copper, tobacco, sago, and other necessary articles. The produce is carried to Singapore and the Arroe Islands.

Except in the swampy districts, the climate is not unhealthy, though the temperature varies greatly, the thermometer sometimes indicating 95° F. by day, and falling to 75° by night. On the south-west coast, the east monsoon or rainy season begins about the middle of April, and ends in September; the dry season is from September to April; and on the north coast they are just reversed.

The limestone rocks on the south-western shore have many natural caverns, which serve as repositories for the bones of the dead; and within the Bight of Lakahia is a fine mountain-girt bay, which the Scientific Commission, appointed by the Netherlands government in 1858, called, after their steamship, Etna Bay, at the extremity of which is a splendid waterfall, 300 feet in height and 50 in breadth, which, seen in contrast with the bright green foliage, appears like a broad silver ribbon thrown over the forest trees.

P. is surrounded by countless islands, some of which are of considerable size. Towards the south is the Louisiade Archipelago, stretching over several degrees of longitude, out of which Aignan rises to the height of 3000 feet, and South-East Island to 2500. Near the Great Bight is Prince Frederik Hendrik Island, separated from the mainland by the Princesses Marianne Strait. Namatotte, a lofty island in Speelman's Bay, in 3° 50' S. lat., and 133° 55' E. long., having good anchorage on the west side, and one of the chief trading-places on the coast; Aidoena, at the entrance of Triton's Bay, in 134° 20' E. long.; and Adi, or Wessels, to the south-east of Cape Van den Bosch, are the principal islands on the south-west coast. On the north, at the mouth of Geelvink Bay, lie the Schouten Islands, in 135°–137° 50' E. long., Mafor, Jobi, and many of less importance. Salawatti is a large and populous island, to the west of P., and further west is Batanta, separated from Salawatti by Pitt's Strait; west and south is the large island of Misool, or Waigamme, in 1° 45'–2° 3' S. lat., and 129° 30'–130° 31' E. long., having an area of 780 square miles, and a large population. It is highly probable that at no very distant geological period the Arroe, Misool, Waigion, Jobi, and other islands, formed part of the mainland of P., banks and soundings, reached by the 100-fathom line, connecting them with it. Only in the trackless wilds of P. and the adjacent islands are found the birds of paradise, with their marvellous development of plumage and incomparable beauty. Mr A. R. Wallace, who recently visited these regions as a naturalist, states that the coast districts of the northern part of P. contain *Paradisaea papuana* and *P. regia* pretty generally distributed; while *P. magnifica*, *P. alba*, and *Sericulus aureus* are scarce and local. The central mountains of the northern peninsula are alone inhabited by *Lophorina superba*, *Parotia ocellata*, *Astrapia nigra*, *Epinachus megala*, and *Craspedophora magnifica*, the unique *Diphyllodes Wilsoni* and *Paradigalla carunculata* probably also existing there. The Arroe Islands contain *P. apoda* and *P. regia*; Misool has *P. papuana*, *P. regia*, and *P. magnifica*; Waigion, *P. rubra*; Salawatti has *P. regia*, *P. magnifica*, *Ep. alba*, and *Sericulus aureus*; Jobi, *P. papuana*, and other species. The Key Islands, Ceram, &c., which are separated by deep sea, have no *Paradisaea*.

The population of P. and the immediately adjacent islands is supposed to be about 800,000; the part claimed by the Netherlands, as having formerly been tributary to the sultans of Tidore, stretching from Cape Bonpland, on the east of Humboldt's Bay, a 140° 47' E. long., to the Cape of Good Hope, and

further west and south-west to 141° E. long., with the islands on the coast, is estimated to have 220,000. The natives of the interior never acknowledged the supremacy of the sultans of Tidore, but the coasts and islands are governed by rajahs and other chiefs appointed by them to certain districts or kingdoms. This power is still exercised by the sultan of Tidore, subject to the approval of the Netherlands' resident at Ternate.

According to the system of Bory de St Vincent, the natives of P. are a race sprung from Neptunians and Oceanians, in character, features, and hair, standing between the Malays and Negroes. Dr Latham places them under the sub-class, Oceanic Mongolids. See ETHNOLOGY. Those who live on the coast and islands are called Papuans, probably from the Malay word Papoewah or Poewah-Poewah, which signifies curly or woolly; the inhabitants of the interior, Alfoers. The Papuans are of middle stature and well made, have regular features, intelligent black eyes, small white teeth, curly hair, thick lips, and large mouth; the nose is sharp, but flat beneath, the nostrils large, and the skin dark brown. Around Humboldt's Bay the men stain their hair with the red earth which is abundant in that locality. Generally, the men are better-looking than the women, but neither are repulsively ugly, as has been repeatedly said. The Papuans of the coast are divided into small distinct tribes, frequently at war with each other, when they plant the paths to their villages with pointed pieces of bamboo or Nipa palm, called randjoes, which run into the feet of a party approaching to the attack, and make wounds which are difficult to cure. The men build the houses, hollow the trunks of trees into canoes, hunt and fish; while the women do all the heaviest work, cultivating the fields, making mats, pots, and cutting wood. Their food consists of maize, sago, rice, fish, birds, the flesh of wild pigs and fruits.

The Alfoers of the interior do not differ much in appearance from the Papuans, but, lower sunk in the savage life, are independent nomades, warlike, and said to be in some districts cannibals. They are called by the coast-people Woeka, or mountaineers, and bring down from their forest retreats the fragrant Masooi bark, nutmegs, birds of Paradise, and crown-pigeons to the coast, bartering them for other articles. The natives of the Arfak and Amberbakin ranges are more settled in their habits, and also cultivate the sugar-cane and tobacco as articles of commerce, but never build their houses at a lower level than 1000 feet from the base of the mountains. The people of the south-west coast are perfectly honest, open-hearted, and trustworthy. They have no religious worship, though some idea of a Supreme Being, called Auwre, according to whose will they live, act, and die, but to whom no reverence is offered. They reckon time by the arrival and departure of the Ceram traders, or the beginning and ending of the dry and rainy seasons, and number only up to ten. Their dead are buried, and after a year or more, the bones taken up, and placed in the family tomb, erected near the house, or selected from the natural caverns in the limestone rocks. The women cover the lower part of the body; the men go all but naked, have their hair plaited or frizzled out, and ornamented with shells and feathers. Marriages are contracted early, and are only dissolved by death, and the women are chaste and modest. At Doreh, on the north coast, the bridegroom leads the bride home, when her father or nearest male relative divides a roasted banana between them, which they eat together with joined hands, and the marriage is completed. They have no religion, but believe that the soul of the father at death returns to the

son, and of the mother to the daughter. The Papuans of Humboldt's Bay are further advanced than those of any other part of the island, carve wood, make fishing-nets, build good houses above the water of the bay, and connect them with the mainland by bridges; each village has also an octagonal temple, ornamented within and without with figures of animals and obscene representations, though nothing is known of their religion. The largest temple, that of Tobaddi, received in 1858 the present of a Netherlands flag, which is flying from its spire, the natives little suspecting it to be a sign of asserted foreign supremacy. They are brave and open enemies, but bold and notorious thieves.

All attempts of the sultans of Tidore to introduce the Mohammedan religion in P. have failed. On the island of Massanama, to the east of Doreh harbour, the Protestant missionaries Ottow and Gieseler have been settled since 1855, and are well treated by the natives. These have formed a pretty complete vocabulary of the Myfore language of that district, which has no resemblance to that of the south-west coast.

P. was discovered by the Portuguese commanders Antonio d'Abreu and Francisco Serram in 1511, in part visited by the Dutch under Schouten in 1615; and in 1828 the Netherlands built a fort, called Du Bus, in Triton's Bay, 3° 42' S. lat., and 133° 51' 5" E. long., which after a few years was abandoned, on account of the deadly climate of the district. In 1845, Captain Blackwood, in H.M.S. *Fly*, surveyed a portion of the Great Bight. Captain Stanley, in the *Rattlesnake*, and Lieutenant Yule of the *Bramble*, surveyed the Louisiade in 1848. Most important knowledge regarding the south-west and north coasts up to 141° E. long. has been obtained through the Scientific Commission sent by the Netherlands government in 1858; but much of the coast, and almost the whole of the interior, are still a terra incognita.

See G. W. Earl, *The Native Races of the Indian Archipelago* (Lond. 1853); *De Zuid-West kust van N. Guinea, door J. Modera* (Haarlem, 1830); *N. Guinea onderzocht en beschreven, door een Nederlandsche Commissie* (Amsterdam, 1862); *Narrative of Search after Births of Paradise*, by A. R. Wallace, F.Z.S., in *Proceedings of the Zoological Society of London* for 1862; and *De Papoea's van de Geelvinkshaai*, by A. Goudawaard (Schiedam, 1863).

PAPULÆ AND PAPULAR DISEASES. Papula, or pimples, constitute one of the eight orders of Bateman and Willan's classification of cutaneous diseases. They occur as little elevations of the cuticle, of a red colour, containing neither pus nor any other fluid, and ending usually in a scurf. They are generally supposed to denote inflammation of the papillæ of the skin; but Erasmus Wilson believes that they represent an inflammatory condition of the secretory orifices, whether sudoriferous or sebaceous. The diseases regarded as papular are Strophulus, Lichen, and Prurigo; but there are other diseases in which the first external symptom is a papular eruption, as, for example, small-pox, in which the papula speedily develops itself into a pustule.

PAPYRI. Rolls made of the paper of the papyrus plant are commonly known as *papyri*, corresponding to the Greek *biblia*. These rolls are of a very remote antiquity, some of the still remaining Egyptian papyri being certainly as old as the 6th dynasty, and others as old as the 12th, or from about 2000 B.C. This is owing to their mode of preservation, and to the peculiarly dry character of Egypt. These rolls have been found deposited in different ways, those of a religious nature being placed upon the bodies of mummies, at the feet, arms, or even in the hands, sometimes, indeed,

packed or laid between the bandages, or even spread over the whole bandages, like a shroud. At the time of the 19th and 20th dynasties (1320–1200 B.C.), they were often deposited in hollow wooden figures of the god Ptah Socharis Osiris, or of the god Osiris, which were placed near the mummies. Papyri of a civil nature were deposited in jars or boxes, which were placed near the mummies, or have been found in the remains of ancient libraries. The following are the principal kinds of Egyptian papyri: I. Hieroglyphical papyri, always accompanied by pictures or vignettes, and consisting of three classes: 1. Solar litanies or texts, and pictures relating to and describing the sun's passage through the hours of the night, when that luminary was supposed to enter the Egyptian Hades or Hell. 2. Books of the empyreal gate, or heaven, with vignettes of deities, and other representations referring to the genesis of the cosmos or universe. 3. The so-called Ritual, consisting of a series of sacred or hermetic books, some of a very remote antiquity, accompanied with rubrical titles and directions as to their efficacy and employment, and comprising various formulas ordered to be placed on the coffins, amulets, and other furniture of the dead, for the better preservation of the souls of the dead and of the mummies in the future state. In this book, chapters giving an account of the future judgment, of the *makhenu*, or boat of the dead, of the Elysian Fields, and of the Halls through which the dead had to pass, are also found. The work was considered by the Egyptians themselves mystic, and parts were supposed to be written by the god Thoth himself. A copy more or less complete, according to the wealth of the deceased, was deposited with all the principal mummies; and from the blank spaces left for the name, which were afterwards filled up, it is evident they were kept ready made.

—II. Hieratic papyri, written in the hieratic or cursive Egyptian hand, comprising a more extensive literature than the hieroglyphic papyri. This handwriting being used for civil as well as religious purposes, the papyri found in it differ considerably from one another, and comprise rituals of the class already mentioned, principally in use about the 26th dynasty, or the 6th C. B.C., but found also on some few papyri of a remote period; a book called the *Lamentations of Isis*; magical papyri, containing directions for the preparation of charms and amulets, and the adjuration of deities for their protection; civil documents, consisting of the examination of persons charged with criminal offences, the most remarkable of which are that of an offender charged with the practice of magic in the 19th dynasty, another of a criminal charged with robbing the royal storehouses, plunder of public property, violation of women, and other crimes in the reign of Sethos I., and the *procès-verbal* of an offender charged with violating the sepulchres of the kings in the reign of Rameses IX. Besides these, there are several letters of various scribes upon subjects connected with the administration of the country and private affairs; laudatory poems of Egyptian monarchs, one describing the campaign of Rameses II. against the Khita or Hittites; historical documents, the journeys of official persons in foreign parts; works of fiction, one written by a scribe for a young prince, containing the adventures of two brothers, the death of the younger, owing to the false accusation of the wife of the elder, his revival, and transformation into a bull and a Persea tree. Prophecies or denunciations, and works on plants and medical subjects, books of proverbs, lists of kings, historical accounts—all occur amongst these documents.—III. The last class of Egyptian papyri, those written in the demotic

PAPYRI—PAPYRUS.

or eucharistic character, consist of rituals, contracts for the sale of mummies and lands, accounts and letters, and miscellaneous documents. These papyri are often bilingual, sometimes accompanied with hieratic or Greek versions. Many of these papyri have been translated by M. de Rouge, Chabas, Heath, Goodwin, Burch, and others. Many Greek papyri have been found belonging to the archives of the Serapeion, referring to the administration of that temple, the orations of Hyperides, and some of the books of Homer. At all times in the history of Egypt, libraries of papyri seem to have existed, and, under the Ptolemies, are said to have contained as many as 700,000 rolls.

Another class of ancient papyri, those of Pompeii and Herculaneum, are of considerable interest, as showing the condition and arrangement of a Roman library. The papyri of Herculaneum are from 8½ to 12½ inches wide, and are rolled up in a cylindrical roll (*volumen*), upon a stick or inner roll (*bacillus*, *umbilicus*), having a stud at the end (*cornu*). They had their titles written on a strip (*choron*), in red letters, and the writing was either on blind lines, or on lines ruled with lead. About 1800 papyri were discovered at Herculaneum, in 1753, in the library of a small house, charred to a cinder, and some of these, by the greatest skill and care, have been unrolled by a very laborious process at Naples. Unfortunately, they have not answered the literary expectations formed of them, consisting of the works of philosophers of the Epicurean school, which the proprietor of the library seems to have collected. Some of the papyri were in Latin, and more difficult to unroll. Many of them have been published. They are only written on one side. When a small number were required, they were placed in a cylindrical bronze chest (*crata*), packed tightly in a perpendicular position, and were taken out single, and read by unrolling from one end. These papyri were of various prices; old ones, like old books, being of immense value, but those containing the works of contemporary authors were not dearer, perhaps, than modern books. Many extensive private and public libraries existed in Greece and Rome, but all have perished except those exhumed from Herculaneum.

Wilkinson, *Man. and Cust.* ii. 62, 147, 168, v. 482; Mahillon, *De Re Diplom.* i. c. 8, p. 38; Winkelman, *ibid.* i. 1; Chabas, *Pap. d'Harris* (Chalon, 1860); *Papyrus Hieratiques* (8vo, Chalon, 1863); Burch, *Introduc. to Study of Hieroglyphs* (12mo, Lond. 1857); *Cambridge Essays* (1858), p. 227; De Rouge, *Re. Contemp.* xxvii. p. 339; Heath, *Exodus Papyri* (Lond. 1855).

PAPYRUS, a genus of plants of the natural order *Cyperaceae*, of which there are several species, the most important being the **EGYPTIAN P.** or *Papyrus* of the ancients (*P. antiquorum*, *Cyperus papyrus* of Linnaeus); a kind of sedge, 8 to 10 feet high; with a very strong, woody, aromatic, creeping root; long, sharp-pointed leaves; and naked, leafless, triangular, soft, and cellular stems, as thick as a man's arm at the lower part, and at their upper extremity bearing a compound umbel of extremely numerous drooping spikelets, with a general involucre of 8 long filiform leaves, each spikelet containing 6—13 florets. By the ancient Egyptians it was called *papu*, from which the Greek *papyrus* is derived, although it was also called by them *nylos* or *deltos*. The Hebrews called it *gôm*, a word resembling the Coptic *gom*, or volume; its modern Arabic name is *Bardi*. So rare is the plant at the present day in Egypt, that it is supposed to have been introduced either from Syria or Abyssinia; but it has been seen till lately in the vicinity of the lake Menzaleh, and specimens sent to England;

and as it formerly was considered the emblem of Northern Egypt, or the Delta, and only grown there if introduced, it must have come from some country

Papyrus (P. antiquorum).

lying to the north of Egypt. It has been found in modern times in the neighbourhood of Jaffa, on the banks of the Anapus, in the pools of the Liane, near Syracuse, and in the vicinity of the Lake Thrasymenus. It is represented on the oldest Egyptian monuments, and as reaching the height of about ten feet. It was grown in pools of still water, growing ten feet above the water, and two beneath it, and restricted to the districts of Sais and Sebennytus. The P. was used for many purposes both ornamental and useful, such as crowns for the head, sandals, boxes, boats, and cordage, but principally for a kind of paper called by its name. Its pith was boiled and eaten, and its root dried for fuel. The papyrus or paper of the Egyptians was of the greatest reputation in antiquity, and it appears on the earliest monuments in the shape of long rectangular sheets, which were rolled up at one end, and on which the scribe wrote with a reed called *kash*, with red or black ink made of an animal carbon. The process of making paper from the papyrus is described in the article **PAPER**. When newly prepared, it was white or brownish white and lissom; but in the process of time, those papyri which have reached the present day have become of a light or dark brown colour, and exceedingly brittle, breaking to the touch. While papyrus was commonly used in Egypt for the purposes of writing, and was, in fact, the paper of the period, although mentioned by early Greek authors, it does not appear to have come into general use among the Greeks till after the time of Alexander the Great, when it was extensively exported from the Egyptian ports under the Ptolemies. Fragments, indeed, have been found to have been used by the Greeks centuries before. It was, however, always an expensive article to the Greeks, and a sheet cost more than the value of a dollar. Among the Romans, it does not appear to have been in use at an early period, although the Sibylline books are said to have been written on it, and it was cultivated in Calabria, Apulia, and the marshes of the Tiber. But the staple was no doubt imported from Alexandria, and improved or adapted by the Roman manufacturers. So extensive was the

Alexandrian manufactory, that Hadrian, in his visit to that city, was struck by its extent; and later in the empire, an Egyptian usurper (Firmus, 272 A.D.) is said to have boasted that he could support an army off his materials. It continued to be employed in the Eastern and Western Empire till the 12th c., and was used amongst the Arabs in the 8th; but after that period, it was quite superseded by parchment. At the later periods, it was no longer employed in the shape of rolls, but cut up into square pages, and bound like modern books.

As a matter of scientific interest, experiments on the manufacture of paper from the *P.* have been made in recent times by Landolina, Seyffarth, and others.—Another species of *P.* (*P. corymbosus* or *P. Pangorei*) is much used in India for making mats. See INDIAN GRASS MATTING.

PAR, or PARR, a small fish, also called BRANGLING and FINGERLING in different parts of Britain, inhabiting rivers and streams, and at one time believed to be a distinct species of the genus *Salmo*, but now almost universally regarded as the young of the salmon. The question will be noticed in the article SALMON. It may here, however, be mentioned, that it is difficult to discriminate the young of different species of this genus. The par rises with extraordinary readiness to the artificial fly; and until it began to receive protection as the fry of the salmon, vast numbers were killed both by youthful and adult anglers.

PARA', or BELEM', a thriving city and seaport of Brazil, capital of the province of the same name, stands on the east bank of the river Para, 80 miles from its mouth. Lat. 1° 28' S., long. 48° 23' W. The harbour is formed by an abrupt curve or inlet of the channel of the river, which is here 20 miles broad. Vessels of the largest size are admitted; the anchorage is roomy, safe, and easy of access. The streets are paved and macadamised; the houses, like those of most Brazilian towns, have whitened walls and red-tiled roofs. Among the principal buildings are the palace of the president, the cathedral, and the churches, all ample in size, and imposing in structure. There are also numerous public squares, a college, and a beautiful botanic garden. The city is supplied with water by water-carts that perambulate the streets. The 'Amazon Navigation Company,' a Brazilian association, has erected large workshops, coal depôts, and wharfs; and steam-navigation is rapidly extending. In 1859—1860, 228 vessels, of 63,347 tons, entered and cleared the port. In 1857—1858, the exports amounted to £399,333; in 1859—1860, to £665,196. The imports in 1857—1858 amounted to £414,967; in 1859—1860, to £529,863. The imports were principally cotton manufactures, wheat and flour, cutlery and hardware, wool, gold and silver wares, coins, and wine. The exports were coffee, sugar, raw cotton, hides, tobacco, diamonds, cocoa, and india-rubber. Pop. 28,000. *P.* is the mart through which passes the whole commerce of the Amazon and its affluents. The city was the seat of revolution during the whole of the year 1835, when a great number of lives were lost and houses destroyed, and grass grew in streets that previously had been the centre of business. It is only since 1848 that the city can be said to have fairly entered upon the path of orderly commercial progress; and since that period, its advance has been rapid.

PARA', an important province of the empire of Brazil, in the extreme north of the country, is bounded on the N. by Guiana and the Atlantic, on the E. by Maranhão and Goyaz, on the S. by Matto Grosso, and on the W. by Amazonas. Area, 532,000

square miles; pop. (in 1856), 207,400. It is by far the largest province of Brazil—having an area more than twice the extent of Austria—is watered by the Amazon and its great affluents the Tapajós, Xingu, and Tocantins; and forms a portion of a district—the Amazon Valley—which has been described by the most thorough explorer of this region as unequalled for richness of vegetable production and fertility of soil. The surface of the country is level, and consists of great plains, intersected by rivers, and covered with primeval forests, and in some cases with rich pasture. The climate, though warm, is not unhealthy. The precious metals, with diamonds, iron, and coal, are found, but are not worked. The timber is valuable, and the chief crops raised upon the very limited area as yet brought under cultivation are coffee, rice, millet, and cotton.

PARA', the name of the south arm of the Amazon, forming an outlet for that river into the Atlantic, on the southern side of the island of Marajo (q. v.). It is 200 miles in length, is 20 miles broad opposite the city of Para, and is 40 miles broad at its mouth. Its most important affluent, and the source whence it draws, perhaps, the great mass of its volume of waters, is the Tocantins. Formerly, the name Para, which is said to signify 'father of waters,' was applied in a general way to the river Amazon. At the time of the spring-tides, the bore rushes up the river with enormous force, forming a wave 15 feet high.

PARA', a coin of copper, silver, or mixed metal, though most generally of copper, in use in Turkey and Egypt; it is the 40th part of a piastre, is divided into 3 aspers, and varies much in value, owing to the debased and complicated condition of the Turkish coinage. Pieces of 5 paras are also in use. The para is equal to about $\frac{1}{4}$ th of a penny sterling in Turkey, and $\frac{1}{16}$ th of a penny sterling in Egypt. See PIASTRE.

PARA GRASS. See PIASSABA.

PAR'ABLE (Gr. *parabolē*, a comparison) was originally the name given by the Greek rhetoricians to an illustration avowedly introduced as such. In Hellenistic and New Testament Greek, it came to signify an independent fictitious narrative, employed for the illustration of a moral rule or principle. This kind of illustration is of Eastern origin, and admirable examples are to be found in the Old and New Testaments, particularly in the discourses of our Lord. It is no less interesting than curious to learn that many of Christ's parables, or at least much of his parabolic imagery, are to be found in the writings of Hillel, Shammai, and other great rabbis, as, for example, the parables of the Pearl of Great Price, the Labourers, the Lost Piece of Money, the Wise and Foolish Virgins, &c. Among modern writers, the German divine Krummacher (q. v.) has greatly distinguished himself in this species of composition. The parable differs from the Fable (q. v.) in the probability or verisimilitude of the story itself, and agrees with it in the essential requisites of simplicity and brevity. In the course of time, the word parable came to lose its significance of figurative speech, and to mean speech generally. From the *parabola* of the Latin Vulgate, came the medieval Latin *parabolare*, whence the modern French *parler* and *parole*. An excellent work on the parables of the New Testament—probably the best in the English language—is that by Archbishop Trench.

PARABOLA, one of the conic sections, is produced by a plane not passing through the vertex, which cuts the cone in a direction parallel to that of a plane touching the convex surface of the cone. A little consideration will shew that

receive if he performed a cure. He was a diligent chemist, investigating the processes of the preparation of metals, and making experiments as to their medicinal virtues; also to discover the philosopher's stone. As a chemist he lived with Sigismund Fugger, one of a family celebrated for its patronage of art and science. His cures, real or pretended, became noised abroad, and he was called to prescribe for all the great men of his day. When he was thirty-three, he boasted of having cured thirteen princes, whose cases had been declared hopeless. He was then at his zenith, and at the recommendation of Ecolampadius was appointed professor of physic and surgery at Basel. He commenced his academic career by publicly burning Galen's works, exclaiming Galen did not know as much as his shoelatchet. 'Reading never made a physician,' he said; 'countries are the leaves of nature's code of laws—patients his only books.' His class-room at first was full to overflowing, but was soon deserted, and he fell into habits of excessive intemperance; indeed his secretary asserts he was drunk every day; never undressed, and went to bed with his famous sword by his side, which he would draw, and flourish about the room. The reason of his departure from Basel was, that a certain dignitary, suffering from gout, in his agony sent for Paracelsus, and promised to give him 100 florins if he cured him. Paracelsus gave him three *laudanum* pills; the canon felt comfortable, and the doctor claimed his fee, but the churchman refused to pay. Paracelsus took him into court, but the judge decided against the professor, who lost his temper, and abused the legal functionary in such a manner that the matter was taken up by the town council, and ended in the expulsion of Paracelsus. He recommenced his wanderings. Wherever he went he excited the regular faculty to a state of violent hatred, not wholly undeserved. At Salzburg he had given offence in the usual way, and the result was, 'he was pitched out of the window at an inn by the doctor's servants, and had his neck broken by the fall.' This took place in 1541.

That a man whose life was such an incoherent medley should exert an influence for centuries after his death, may well be a matter of surprise, but he and the age were fitted for each other. He struck the weak point of the prevailing system of medicine; he appealed to the public as to whether it were not a false system that could only lead to failure, and he proposed a system of his own, which, though shrouded in absurdity and obscurity, inaugurated a new era of medicine. The prominent idea of his system is, that disease does not depend upon an excess or deficiency of bile, phlegm, or blood, but that it is an actual existence, a blight upon the body subject to its own laws, and to be opposed by some specific medicine. See the works of Paracelsus; also of Schulz (1831); Lessing (1839); Rademacher (1848); and Russell (*History and Heroes of Medicine*, 1861).

PARACHUTE (Fr. *chute*, a fall), a machine invented for the purpose of retarding the velocity of descent of any body through the air, and employed by aeronauts as a means of descending from balloons. It is a gigantic umbrella, strongly made, and having the outer extremities of the rods, on which the canvas is stretched, firmly connected by ropes or stays to the lower part of the handle. The handle of the parachute is a hollow iron tube, through which passes a rope connecting the balloon above with the car (in which are the aeronauts and their apparatus) beneath, but so fastened, that when the balloon is cut loose, the car and parachute still remain connected. When the balloon ascends, the parachute collapses like an umbrella; but when the balloon

rope is severed, and the car begins to descend, the parachute is extended by the action of the air, and prevents the car from acquiring a dangerous velocity of descent; the final velocity in those cases where the machine is of a size proportioned to the weight it has to support, being no more than would be acquired by a person leaping from a height of between two and three feet. But the slightest derangement of the parachute's equilibrium, such as might be caused by a breath of wind, or the smallest deviation from perfect symmetry in the parachute itself, immediately produces an oscillatory motion of the car, having the apex of the parachute as a centre, and the oscillations becoming gradually greater and more rapid, the occupants of the car are in most cases either pitched out, or are along with it dashed on the ground with frightful force. This defect in the parachute has been attempted to be remedied in various ways, but hitherto without success. The first successful experiment with the parachute was made by Blanchard at Strasburg in 1787, and the experiment has been often repeated by Garnerin and others; very frequently, however, with fatal results.

The parachute was employed by Captain Boxer, R.N., as an essential part of his patent light-ball, for discovering the movements of an enemy at night, and was so arranged as to open up when the lighted ball had attained its greatest elevation, so as to keep it for a considerable period almost suspended in the air.

PARADE (from *parare*) signified in its original sense a prepared ground, and was applied to the courtyard of a castle, or to any enclosed and level plain. From the practice of reviewing troops at such a spot, the review itself has acquired the name of parade. In its modern military acceptation, a *parade* is the turning out of the garrison, or of a regiment in full equipment, for inspection or evolutions before some superior officer. It is the boast of British troops that their line and discipline are as perfect under an enemy's fire as on the parade ground.

PARADISE. See EDEN.

PARADISE, BIRD OF. See BIRD OF PARADISE.

PARADOS—another name for *Traverse*—is an intercepting mound, erected in various parts of a fortification for the purpose of protecting the defenders from a rear or ricochet-fire. See **FORTIFICATION**.

PARADOX (Gr. *para*, beside, or beyond, and *doxa*, an opinion), a term applied to whatever is contrary to the received belief. Cicero, in his book on paradoxes, states that the Stoics called by this name all those unusual opinions which contradict the notions of the vulgar. It follows from this that a paradox is not necessarily an opinion contrary to truth. There have been bold and happy paradoxes whose fortune it has been to overthrow accredited errors, and in the course of time to become universally accepted as truths. It is, perhaps, even one of the prerogatives of genius to bring such into the world, and thereby to alter the character of an art, a science, or a legislation; but this, the highest form of paradox, which is only another name for originality of thought, or for novelty of scientific discovery, is rare. The paradox which springs from a passion for distinction, and which, in its efforts to achieve it, despises good sense and the lessons of experience, is far more frequent. It may not be at bottom a positive error in thought, but it is so exaggerated in expression, that if taken literally it actually does mislead. This is the besetting sin of the brilliant and epigrammatic class of writers.

founded the city of Assuncion, and established P. as a province of the viceroyalty of Peru. The warlike native tribe of the Guaranis, however, a people who possessed a certain degree of civilisation, and professed a dualistic religion, long successfully resisted the Spanish arms, and refused to receive either the religion or the social usages of the invaders. In the latter half of the 16th c., the Jesuit missionaries were sent to the aid of the first preachers of Christianity in P.; but for a long time they were almost entirely unsuccessful, the effect of their preaching being in a great degree marred by the profligate and cruel conduct of the Spanish adventurers, who formed the staple of the early colonial population. In the 17th c. the home government consented to place in their hands the entire administration, civil as well as religious, of the province; which, from its not possessing any of the precious metals, was of little value as a source of revenue; and in order to guard the natives against the evil influences of the bad example of European Christians, gave to the Jesuits the right to exclude all other Europeans from the colony. From this time forward the progress of civilisation as well as of Christianity was rapid. The legislation, the administration, and the social organisation of the settlement were shaped according to the model of a primitive Christian community, or rather of many communities under one administration; and the accounts which have been preserved of its condition, appear to present a realisation of the ideal of a Christian Utopia. On the expulsion of the Jesuits from P. in 1763, the history of which is involved in much controversy, the province was again made subject to the Spanish viceroys. For a time the fruits of the older civilisation maintained themselves; but as the ancient organisation fell to the ground, much of the work of so many years was undone; the communities lapsed into disorganisation, and by degrees much of the old barbarism returned. In 1776, P. was transferred to the newly-formed viceroyalty of Rio de La Plata; and in 1810 it joined with the other states in declaring its independence of the mother kingdom of Spain, which, owing to its isolated position, it was the earliest of them all to establish completely. In 1814, Dr Francia (q. v.), originally a lawyer, and the secretary of the first revolutionary junta, was proclaimed dictator for three years; and in 1817, his term of the office was made perpetual. He continued to hold it till his death in 1840; and although many of his measures tended to improve the condition of the country, and to develop its internal resources, yet his rule was arbitrary and despotic in the highest degree; and his attempt to isolate the territory from commercial intercourse with the rest of the world, was attended with a complete stagnation of commerce and the enterprise to which it leads. On his death, the government was vested in consuls, and in 1844 a new constitution was proclaimed, the head of which is a president, Don Carlos Antonio Lopez, elected in that year for ten years, re-elected in 1854 for three years, and again in 1857 for seven years further. Under Lopez, the restrictions on foreign commerce have been gradually removed, and in 1852 commercial treaties were signed with the Argentine Republic, and with the United States, Great Britain, France, and Sardinia.

The republic is divided into 25 departments. The central department, in which the capital, Assuncion, is situated, contained, in 1857, 398,628, or nearly one-third of the whole inhabitants; and the capital itself, 48,000. The inhabitants of the towns consist chiefly of whites, or of half-breeds (*mestizos*), who closely resemble whites; the language commonly

spoken being Spanish. The native population of the provinces are chiefly Guaranis, among whom are scattered some remnants of other tribes, almost all, however, now speaking the Guarani language.

PARAGUAY, an important river of South America, an affluent of the Parana (q. v.), rises in the Brazilian province of Mato Grosso, on a plateau of red sandstone, in lat. 13° 30' S., long. about 55° 50' W., 9535 feet above sea-level. The sources of the river are a number of deep lakes, and eight miles from its source, the stream already has considerable volume. Pursuing a south-west course, and after flowing through a level country covered with thick forests, the P. is joined from the west by the Jauru, in lat. 16° 30' S. It then continues to flow south through the Marsh of Xarayes, which, during the season when the stream rises, is an expansive waste of waters, stretching far on each side of the stream, and extending from north to south over about 200 miles. The river still pursues a circuitous but generally southward course, forming from 20° to 22° S. the boundary-line between Brazil and Bolivia, thence flowing south-south-west through the territories of Paraguay to its junction with the Parana, in lat. 27° 17' S., a few miles above the town of Corrientes. Its chief affluents are the Cuyaba, Tacuary, Mondego, and Apa on the left, and the Jauru, Pilcomayo, and Vermejo on the right. Except in the marshy districts, the country on both banks of the river is rich and fertile, and abounds in excellent timber. The entire length of the river is estimated at 1800 miles; it is on an average about half a mile in width, and is navigable for steamers to the mouth of the Cuyaba, 100 miles above the town of Corumba. The waters of the P., which are quite free from obstructions, were declared open to all nations in 1852; and since 1858 the great water system, of which this river forms such an important part, is regularly traversed by steamers which ply between Buenos Ayres on the Rio de la Plata, and Cuyaba, on the river of the same name, one of the head waters of the Paraguay.

PARAGUAY TEA. See *Mirá*.

PARAHIBA, one of the most eastern maritime provinces of Brazil, bounded on the N. by Rio Grande do Norte, on the S. by Pernambuco, on the W. by Ceara, and on the E. by the Atlantic. Area, 21,700 square miles; pop. 209,300. It is traversed by a river of the same name, by a number of smaller streams, and by mountainous ridges, between which are valleys, the soils of which are, for the most part, dry and sandy. Cotton of excellent quality, mandioc, and tobacco are grown; and cotton, sugar, and timber are exported. Capital, Parahiba (q. v.).

PARAHIBA, a seaport of Brazil, capital of the province, and situated on the river of the same name, about 10 miles from the sea. Besides the cathedral, it contains a number of religious houses, two colleges, and other educational institutions. In 1859—1860, 152 vessels of 51,363 tons entered and cleared the port. Pop. 10,000.

PARALLAX is the apparent displacement of an object caused by a change of place in the observer. When an object at M is looked at from P, it

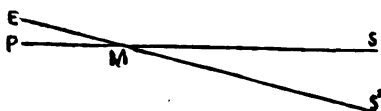


Fig. 1.

appears in line with some object, S; but after the observer has moved to E, M has apparently retro-

and $Q \downarrow$ P or $R : P :: AC \perp BC$ or $AB : BC$, from which proportions we derive the principle of the lever, $P \times AC = Q \times BC$, and also that $R \times BC = P \times AB$, whence $BC = \frac{P}{R} \times AB$, and the point C is found. The failing case of this proposition is when P and Q acting in opposite parallel directions at different points are equal, in which case the resultant $R = Q - P = Q - Q = 0$. In all other cases there is a progressive motion, such as would be caused by the action of a single force $R (= Q \pm P)$ acting at the point C in the direction CR ; but in the failing case, since $R = 0$, there is no progressive motion, but a rotatory movement

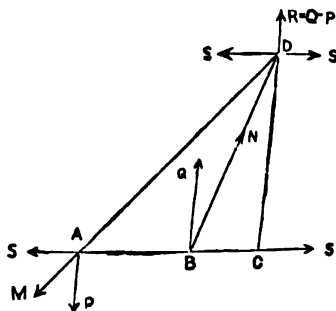


Fig. 3.

round the centre of AB. See COUPLE. It is of no consequence whether A and B be the true points of application of the forces P and Q, provided their directions when produced pass through these points, and the point of application of the resultant need not be in the line joining the points of application of the component forces, but its direction must when produced pass through C. If there be more than two parallel forces, the resultant of the whole is found by compounding the resultant of the first two with the third in the way given above, thus obtaining a new resultant, which is similarly combined with the fourth force; and so on till the final resultant is found. The centre of gravity is only a special name for the point of application of the final resultant of a number of parallel forces.

PARALLELEPIPED (Gr.), frequently, but improperly written *Paralleloiped*, is a solid figure having six faces, the faces being invariably parallelograms, and any two opposite faces equal, similar, and parallel. If the faces are all squares, and consequently equal, the parallelepiped becomes a cube. The volume of a parallelepiped is found by multiplying the area of one face by its distance from the opposite one.

PARALLELOGRAM, in Mathematics, is a quadrilateral rectilinear figure which has its opposite sides parallel; the opposite sides are therefore equal, and so are the opposite angles. If one angle of a parallelogram be a right angle, all its angles are right angles, and the figure is then called a *rectangular parallelogram*, or shortly, a *rectangle*; and if at the same time all the sides are equal, the figure is a *square*, otherwise it is an *oblong*. If the angles are not right angles, but all the sides are equal, it is called a *rhombus*; and if the opposite sides only are equal, a *rhomboid*. The two lines which connect the opposite corners of a parallelogram are called its *diagonals*, each bisects the parallelogram, and they bisect each other; the sum of their squares also is equal to the sum of the squares of the sides of the parallelogram.

All parallelograms which have equal bases and equal altitudes are equal in area, whether they be similar in shape or not, and the area of a parallelogram is found by multiplying its base by the height.

PARALLELOGRAM OF FORCES. See
COMPOSITION OF FORCES.

PARALLELS, in Military language, are trenches cut in the ground before a fortress, roughly parallel to its defences, for the purpose of giving cover to the besiegers from the guns of the place. The parallels are usually three, with zigzag trenches leading from one to another. The old rule used to be to dig the first at 600 yards distance, but the improvements in artillery have rendered a greater distance necessary; and at Sebastopol, the allies made their first trench 2000 yards from the walls. The third trench is very near to the besieged works, and from it saps and zigzag approaches are directed to the cover-way.—The bearing of parallels in the general conduct of a SIEGE will be found described under that head.

PARALLELS or CIRCLES OF LATITUDE
are circles drawn round the surface of the earth parallel to the equator. They may be supposed to be the intersections with the earth's surface of planes which cut the earth at right angles to its axis. The greatest of these circles is the equator, which has the centre of the earth for its centre, the radius for its radius, and is equally distant at all points from each pole. It is evident that of the others, those next the equator are greater than those more remote, and that they become less and less till at the poles they vanish altogether. The radius of any one circle is evidently equal to the earth's radius multiplied into the cosine of its latitude or distance from the equator. The rotary velocity of the earth's surface, which is about 17½ miles per minute at the equator, is only 8½ miles in lat. 60°, in lat. 82½° (the most northerly point yet reached) is only 2½ miles; and in lat. 89½° (within 35 miles of the pole) is not more than 207 yards per minute.

The most important parallels of latitude are the *Tropics of Cancer* ($23^{\circ} 28' \text{ N. lat.}$) and *Capricorn* ($23^{\circ} 28' \text{ S. lat.}$), and the *Arctic* ($66^{\circ} 32' \text{ N. lat.}$) and *Antarctic Circles* ($66^{\circ} 32' \text{ S. lat.}$).

PARALYSIS (Gr., a loosing or relaxing), or **PALSY**, is a loss, more or less complete, of the power of motion; but by some writers the term is employed to express also loss of sensation. When the upper and lower extremities on both sides, and more or less of the trunk, are involved, the affection is termed *General Paralysis*. Very frequently only one-half of the body laterally is affected, the other side remaining sound; to this condition the term *Hemiplegia* is given. When the palsy is confined to all the parts below an imaginary transverse line drawn through the body, or to the two lower extremities, the condition is termed *Paraplegia*. When one part of the body, as a limb, one side of the face, &c., is exclusively attacked, the affection is known as *local palsy*. In some cases the loss of sensation and the power of motion in the paralysed part is entire, while in others it is not so. In the former the paralysis is said to be *complete*, in the latter, *partial*. In most cases, but not invariably, sensibility and motion are simultaneously lost or impaired. When motion is lost, but sensation remains unimpaired, the affection has received the name of *akinesia* (Gr. a, not, and *kinesis*, motion). More rarely, there is a loss of sensibility while the power of motion is retained; and to such cases the term *anesthesia* (Gr. a, not, and *anesthesia*, sensation) is applied. This affection occurs most

physicians, and *The Trembles*, as the patient usually calls it. It consists in a convulsive agitation of the voluntary muscles, especially when an attempt is made to cause them to act under the influence of the will; a patient with this affection walks with uncertain steps, his limbs trembling and dancing as if they had been hung upon wires. When sitting down he exhibits little or no indication of his disease, but on rising he cannot hold his legs steady, nor direct them with precision; and in severe cases he falls to the ground if not supported. The arms are similarly agitated, and the tongue is usually so tremulous as to render the articulation hurried and unnatural. The disease is especially common in artisans employed in the gilding of metals, and particularly of silver, by means of heat; it is also frequent among the workers of quicksilver mines, in which the crude metal is purified by heat. The time required for the production of the disease varies extremely in different cases (according to Dr Watson, from two years to five-and-twenty). The duration of the complaint is considerable; it may last two or three months, or longer, but it is seldom fatal.

The palsy arising from the absorption of lead has been already noticed in the article LEAD-POISONING.

A specific form of paralysis of the lower extremities, consequent on the use of flour from the beans of the *Lathyrus sativus*, is common in certain parts of India and in Thibet. The ripe bean is an ordinary article of food when made into flour, but it is generally used with wheat or barley flour; it is only when it exceeds one-twelfth part that it is at all injurious, and when it exceeds one-third that the paralysis sets in. Other species of *Lathyrus* have been known occasionally to induce similar symptoms in European countries.

We shall enter into no details regarding the treatment of hemiplegia and paraplegia, as the management of these serious affections should be exclusively restricted to the physician. When a patient has an attack of hemiplegia (or a *paralytic stroke*) all that should be done before the physician arrives is to place him in a horizontal position, with the head slightly raised, and to remove any impediments presented by the dress to the free circulation of the blood. Should the physician not arrive in an hour or two, it may be expedient to give the patient a sharp purge (half a scruple of calomel, followed in a few hours by a black draught, if he can swallow; and two drops of croton oil, mixed with a little melted butter, and placed on the back of his tongue, if the power of deglutition is lost), and without waiting for its action, to administer an injection (or clyster) consisting of half an ounce of oil of turpentine suspended (by rubbing it with the yolk of an egg) in half a pint of thin gruel; and cold lotions may be applied to the head, especially if its surface be hot. The question of blood-letting—the universal treatment a quarter of a century ago—must be left solely to the physician. It should, however, be generally known, that if the patient be cold and collapsed; if the heart's action be feeble and intermittent; if there be an anæmic state; if the patient be of advanced age; if there is evidence of extensive disease of the heart or arterial system; or lastly, if there is reason, from the symptoms, to believe that a large amount of hemorrhage has already taken place in the brain; these singly, and *a fortiori* conjointly, are reasons why blood should not be abstracted.

Facial palsy, unless the seat of the disease be within the cavity of the cranium, will usually yield in the course of a few weeks to cupping and blistering behind the ear of the affected side, purgatives, and small doses of corrosive sublimate

(one-twelfth of a grain three times a day, combined with a little of the compound tincture of bark), which must be stopped as soon as the gums are at all affected. Exposure to cold air must be carefully avoided during treatment.

Little or nothing can be done to cure *Paralysis Agitans*. In the treatment of *Mercurial Tremor*, the first step is to remove the patient from the further operation of the poison, while the second is to remove the poison already absorbed into the system, which is effected by the administration of iodide of potassium. This salt combines with the metallic poison in the system, and forms a soluble salt (a double iodide of mercury and potassium), which is eliminated through the kidneys. Good food and tonics (steel or quinia, or the two combined) should be at the same time freely given.

The writer of this article has no personal knowledge of the treatment that should be recommended in the paralysis produced by the use of *Lathyrus sativus*, but cases are reported which seem to have been benefited by good diet, tonics, strychnia, and the application of blisters to the loins.

PARAMARIBO, the capital of Dutch Guiana, is situated on the western bank of the river Surinam, about 10 miles from its mouth, in 5° 45' N. lat., and 55° 15' W. long. It forms a rectangle of nearly a mile and a half in length by three-quarters in breadth. The streets are broad, covered with shell-sand, and planted on both sides with orange, lemon, tamarind, and other trees. Near the river, the houses, which are chiefly of wood, stand somewhat closely together, but in the remoter parts each is surrounded by its own garden. The rooms are wainscoted with the choicest woods, and elegantly furnished.

In approaching P. from the sea, Fort Zeelandia is first reached; then the Bureau of Finance and Court of Justice on the Government Plain, which is surrounded by stately cabbage-palms; the governor's house, with shady double avenue of tamarind-trees; and lastly, the business streets stretching along the river side. There are a Dutch Reformed, a Lutheran, Moravian, two Roman Catholic churches, and two synagogues. Fort Zeelandia has a large and beautiful barrack, with several roomy houses for the officers. P. has a neat, pleasant, and picturesque appearance, the white painted houses, with bright-green doors and windows, peeping out from the shady trees, and the river being thronged with the tent-boats and canoes which are constantly arriving and departing.

On 1st January 1861, the population amounted to 17,830, of whom 5073 were slaves. The 27 schools were attended by 1020 boys and 843 girls. By royal decree of 6th February 1851, the flogging of slaves in the Netherlands West Indies was forbidden, except through officers appointed for the purpose, and the number of lashes was limited. This check, however, was frequently evaded, and the greatest barbarities practised, so that the feeling in favour of emancipation increased in the Netherlands, and a bill was passed, 8th August 1862, for emancipating the slaves on the 1st July 1863.

P. being the only port, except Nickerie Point, at the mouth of the Corentyn, enjoys a considerable export and import trade. In 1860 the total arrivals in Dutch Guiana were 219 ships, of which 50 were Netherlands, 31 United States, and 138 of other nations; the outward bound numbered 217. About a fourth part of the shipping cleared at Nickerie, which is the most productive portion of the colony; one estate, the Nursery, producing (in 1860) sugar, 1,500,000 lbs.; molasses, 75,985 gallons; and rum, 37,000 gallons.

The climate of Dutch Guiana is not particularly

healthy. In 1849, the births by slaves were 2·82 per cent, the deaths 3·49; while in Curaçao, the births amounted to 3·86, the deaths to 2·77 per cent, and at Bonaire, to 3·22 and 1·21 respectively. The statistics for 1860 were more favourable for Surinam, the births among whites being 10 in excess of the deaths, and of the slaves 399. Elephantiasis, Antrax and Leprosy are fearfully prevalent among the black population of P. and neighbourhood.

The maximum fall of rain is in May, the minimum in September and October. By observations made at five different points, during eight consecutive years, it was found that the quantity varies much, being smallest at Nickerie, in the west, and largest at Monthouin in the east of the colony. The averages of the eight years, from 1847 to 1854, were, Nickerie, 66·70 inches; Groningen, on the river Saramacca, 90·50; Paramaribo, 99·85; Geertruid, on the river Surinam, 103·25; and Monthouin, 127·75. In Georgetown, British Guiana, the average fall is 100·50 inches.

The coast of Dutch Guiana is an alluvial deposit formed by the rivers and equatorial stream which flows eastwards. Further inland, the soil is diluvial, bearing the finest timber trees; and south of this line are extensive savannahs of white sand, sloping towards the hills and mountains of the interior, which are chiefly of gneiss and granite.

In 1860, the letters received from foreign countries amounted to 13,764, the newspapers to 17,250; despatched, 23,144 letters and 5435 newspapers.

PARAMATTA is a light worsted twilled fabric for female dress. It was invented at Bradford, in Yorkshire, and has become an important manufacture of that place. The web consists of combed cotton wool, and the warp of cotton. It resembles a texture the Coburg and Orleans cloths.

PARAMATTA, a pleasantly situated town of New South Wales, stands near the west extremity of Port Jackson, on a small river of the same name, and is 15 miles by land west-north-west of Sydney, with which it is connected both by steamer and railway. The houses are mostly detached, and the streets are wide and regular, the principal one being about a mile in length. The institutions comprise churches, schools, an orphan and a lunatic asylum, and a prison. There was formerly an observatory here; but it was removed to Sydney in 1858. 'Colonial tweeds,' 'Paramatta cloths,' and salt are manufactured. Pop. 5577.

The town of P., formerly called Rosehill, is, with the exception of Sydney, the oldest in the colony. The first grain raised in the colony was grown here, and the first grants of land made.

PARAMETER, or LATUS RECTUM, a term used in conic sections, denotes, in the case of the parabola, a third proportional to the abscissa of any diameter and its corresponding ordinate; in the ellipse and hyperbola, a third proportional to a diameter and its conjugate. The parameter of any diameter is, in the case of the parabola, the same as the double ordinate of that diameter which passes through the focus, and is four times as long as the distance between the diameter's vertex and the directrix. The term parameter was also at one time used to denote any straight line about a curve, upon which its form could be made to depend, or any constant in its equation, the value of which determined the individual curve; but its employment in this sense is now discontinued, except in the theory of homogeneous differential equations, where the constants, for the purpose of aiding the solution, are supposed to vary; and the method is consequently denominated the 'Variation of the Parameters.' In the application of this method to

determine the orbital motions of the planets, the 'seven necessary data' (see ORBIT) were called parameters, but for this the term 'elements' is now substituted.

PARANA', a province in the south of Brazil, is bounded on the N. by the province of São Paulo on the E. by the Atlantic, S.E. by Santa Catharina, S. by Rio Grande do Sul, W. by Uruguay and Paraguay. Area stated at 115,000 square miles. Pop. 72,000, one-sixth of whom are slaves. The capital is Curitiba, and previously to 1852 this province formed a territory called the Comarca of Curitiba, included in the province of São Paulo. It fully commenced its provincial career in 1853. The sea coast is indented by several bays, but the chief and almost the only port as yet is Paranaguá. A line of mountains runs parallel to the coast at a distance of about 80 miles inland, and throws out spurs and branches westward. The streams flowing east from this water-shed, though numerous, are inconsiderable; while the rivers flowing westward, into the Parana (q. v.), which forms the western boundary of the province, are all about or upwards of 400 miles in length. The principal are the Paranapanema, Ivay, Piquery, and Yguassu. The climate is unusually healthy; the soil is fertile; and agriculture, rearing cattle and swine, and gathering maté or Paraguay tea are the chief employments.

The port of Paranaguá, situated in a picturesque district, on a bay of the same name, is about 400 miles south-west of Rio de Janeiro. The town is clean and pretty, and contains about 3000 inhabitants. Maté to the value of 1,000,000 dollars is exported annually from this town.

PARANA, an important river of Brazil, rises in the province of Minas Geraes, about 100 miles north-west of Rio de Janeiro. It flows west for upwards of 500 miles, through the provinces of Minas Geraes and São Paulo. In the latter it is joined by the Parnahiba, after which its course alters, and it flows south-south-west to Candelaria. Passing this town, it flows west for 200 miles to its confluence with the Paraguay (q. v.), and then bending southward, passes Santa Fe, below which its channel frequently divides and encloses numerous islands. After passing Santa Fe, it rolls onward in a south-east direction, and unites with the Uruguay in forming the Rio de la Plata. Entire length about 2400 miles. It draws a number of considerable tributaries from the province of Parana (q. v.); and of the others, the chief are the Paraguay, Uruguay, Pardo, Tiete, and Parnahiba. For vessels drawing 7½ feet it is navigable to Corrientes, upwards of 600 miles from its mouth.

PARAPET (Ital. *para-petto*, from *parare*, to protect, and *petto*, the breast), a wall raised higher than the gutter of a roof for protection; in



Ornamented Gothic Parapet.

military works, for defence against missiles from without (see FORTIFICATION); in domestic buildings, churches, &c., to prevent accident by falling from the roof. Parapets are of very ancient date. The Israelites were commanded to build 'a battlement' round their flat roofs. In classic architecture, balustrades were used as parapets. In Gothic architecture, parapets of all kinds are used. In

early work they are generally plain, but in later buildings they are pierced and ornamented with tracery, which is frequently of elaborate design, especially in French Flamboyant work. Shields and little arcades are also used as ornaments to parapets; and the battlements of castles are imitated in the parapets of religious and domestic buildings.

PARAPH (Gr. *para*, and *haplo*, to touch), an addition to the subscription of a name formed by a flourish of the pen, which, during the middle ages, constituted some sort of provision against forgery. Its use is not altogether extinct in diplomacy, and in Spain the paraph is still a usual part of a signature.

PARAPHERNALIA (Gr. *para*, beside, or beyond; *pherné*, dower) is a term borrowed from the Roman law to denote certain articles of personal adornment and apparel belonging to a married woman. According to the usual rule in the law of England, all the personal property of a woman becomes the property of her husband when the marriage takes place, unless there is a marriage settlement; but there is an exception as regards the trinkets and dress of the wife so far as suitable to her rank in life, and which she continues to use during the marriage. In such a case the property in these articles does not vest absolutely in the husband. He cannot bequeath them by his will to a third person, but if he gave them to the wife, he may pawn, or sell, or give them away, and they can be seized in execution to pay his debts, except so far as they constitute necessary clothing. And if he were to die insolvent, they may, except that part which is necessary clothing, be taken by the husband's creditors. If the paraphernalia were given, not by the husband but by a third party before or during marriage, then they are presumed to be given for the wife's separate use, and the husband or his creditors cannot in any way interfere with them. In the law of Scotland, the paraphernalia of a married woman include not merely personal clothing and trinkets, but articles of furniture, such as a chest of drawers. The husband there can neither pawn, nor pledge, nor give away the paraphernalia, nor can his creditors attach them either during his life or after his death.

PARAPHRASE (Gr. *para*, beside, and *phrazein*, to speak) is the name given to a verbal expansion of the meaning either of a whole book, or of a separate passage in it. A paraphrase consequently differs from Metaphrase, or strictly literal translation, in this, that it aims to make the sense of the text clearer by a lucid circumlocution, without actually passing into commentary. The versified passages of Scripture, forming part of the Psalmody of the Scottish Church, are popularly known as 'the Paraphrases.'

PARAPLEGIA. See PARALYSIS.

PARÁS'ARA is the name of several celebrated personages of ancient India, met with in the *Mahābhārata* (q. v.), the *Purāṇas* (q. v.), and other works. Of one personage of this name, the *Mahābhārata* relates that he was the son of S'akti, who was the son of the patriarch Vasiṣṭha. King Kalmāshapāda once meeting with S'akti in a narrow path in a thicket, desired him to stand out of the way. The sage refused; on which the Rāja beat him with his whip, and S'akti cursed him to become a Rākhasa, or demon. The Rāja, in this transformation, killed and ate S'akti, together with the other sons of Vasiṣṭha. S'akti, however, had left his wife, Adris'yanti, pregnant, and she gave birth to Parás'ara, who was brought up by his grandfather. When he grew up, and was informed of his father's

death, he instituted a sacrifice for the destruction of all the Rākhasas, but was dissuaded from its completion by Vasiṣṭha and other sages. The same legend is referred to by the *Vishṇu-Purāṇa*, where P. is introduced as relating, himself, part of this story, and adding, that the saint Pulastya, one of the mind-born sons of Brahmā, in reward of the clemency he had shewn even towards such beings as the Rākhasas, bestowed on him the boon of becoming the author of a compendium, or rather the compiler, of the *Purāṇas*, and of the *Vishṇu-Purāṇa* in particular. 'This tradition,' Professor Wilson observes (*Vishṇu-Purāṇa*, ed. Hall, vol. i. p. 10), 'is incompatible with the general attribution of all the *Purāṇas* to Vyāsa;' but it may perhaps point to a later recension when, to the native mind, Vyāsa would still remain the reputed author of the older *Purāṇas*, although, of course, even this assumption has little claim to historical truth.—A P., probably different from the one named, is the author of a celebrated code of laws; he is mentioned by Yājñavalkya in his standard work, and often quoted by the commentaries.—A probably third P. is the reputed author of a *Tantra* (q. v.); and a fourth, the author of an astronomical work.—Parás'aras (in the plural) designates the whole family to which the different Parás'aras belong.

PARASITE (Gr. from *para*, beside; *sitos*, food; one who eats with another; hence one who eats at the expense of another), a common character in the Greek comedies; a low fellow, who is ready to submit to any indignity, that he may be permitted to partake of a banquet, and who lives as much as possible at the expense of others.

PARASITIC ANIMALS are numerous. Some of them are Entozoa, and some are Epizoa. See these heads. They belong to different classes, and even to different divisions of the animal kingdom; all, however, are invertebrate. Many are of the division *Articulata*, and many of the division *Radiata*. Besides worms of various kinds, there are among parasites not a few crustaceans, as the Lernæans, &c., and not a few insects, as the Louse. These insects constitute the order *Parasita* or *Anoplura*. The characters of the order are noticed in the article LOUSE. It remains, however, to be added, that the order is divided into two sections—in the first of which, *Pediculidea*, the mouth is small and quite suctional; whilst in the second, *Nirmidea*, it is furnished with mandibles and hooked maxilla. The species of the first section are found only on man and mammals; those of the second section, almost exclusively on birds, although one infests the dog. The *Nirmidea* shew much greater activity than the *Pediculidea*. When a bird dies, the bird-lice congregate near the beak, and seem disquieted, apparently anxious to change their abode. Some of the cirrhopods which live in the skin of large marine animals, as whales, can scarcely be regarded as parasitic animals, but rather bear to them a relation such as *Epiphytes* do to parasitical plants, not deriving their food from the animal on which they live. Tape-worms, ascarides, and other intestinal worms, do not directly draw sustenance from the animal in which they live, by extracting its juices, but they live at its expense, by consuming its food, after the food has undergone, in great part, the process of digestion.

PARASITIC DISEASES constitute one of the recognised orders of disease in Dr Farr's classification. See NOSOLOGY. In these diseases, certain morbid conditions are induced by the presence of animals or vegetables which have found a place of subsistence within some tissue or organ, or upon some surface of the body of man or of other animals.

PARASITIC DISEASES—PARASITIC PLANTS.

Free plants are not exempt from disorders of this nature (see PARASITIC PLANTS). The forms of animal life giving rise to parasitic diseases are described in the articles ASCARIDES, CESTOIDEA, ENTOMOZOA, ERINIA, GUINER-WORM, ITCH-INSECT, LOUSE, NEMATODA, STRONGYLUS, TAPEWORMS, TRICHINA, &c. With the vegetable structures which give rise to special diseases we are less accurately acquainted, in consequence of the limited knowledge of cryptogamic botany possessed by many writers who have recorded their experience of these cases. These parasites are either fungi or algae, and are supposed of simple sporules, germs, or cells, or of cells arranged in rows or groups, which are so minute as to require the microscope for their recognition. Fungi are the most numerous of all plants in regard to genera and species, and their growth is associated with serious injury both to animal and vegetable life. It is not, however, always easy to determine whether they are the direct cause of disease, or whether the diseased tissue has merely afforded a suitable nidus for their development. 'It is certain,' says Dr Aitken, who has entered more fully into this subject than any other English writer on the practice of medicine, 'that wherever the normal chemical processes of nutrition are impaired, and the incessant changes between solids and fluids slacken, then, if the part can furnish a proper soil, the cryptogamic parasites will appear. The soil they select is, for the most part, composed of epithelium or cuticle, acid mucus or exudation. Acidity, however, though favourable to their growth, is not indispensable, since some of the vegetable parasites grow upon alkaline or neutral ground, as on ulcerations of the trachea, or in fluid in the ventricles of the brain. Certain atmospheric conditions seem favourable to the occurrence of these vegetable parasites. For example, *Tinea tonsurans* may be quite absent for years in places such as workhouses, where it commonly exists, and then for several months every second or third child in the place gets the disease.'

There is undoubted evidence from the observations and experiments of Devergie, Von Bärensprung, and others, that these parasitic diseases may be transmitted by contagion from horses, oxen, and other animals to man; while conversely, Dr Fox mentions an instance of a white cat which contracted the mange from *Tinea tonsurans* (ringworm of the scalp), which affected the children of the family to which it belonged—the fungus of the mange in the cat being the same fungus as that of *Tinea* in the human subject, viz., the *Tricophyton furfur* (trich.), of a hair, and *phyton*, a plant).

The principal vegetable parasites associated in man with special morbid states are arranged by Aitken (*The Science and Practice of Medicine*, 1863, 2d edit. vol. ii. p. 177) as follows: 1. The *Tricophyton tonsurans*, which is present in the three varieties of *Tinea tonsurans*—viz., *T. circinatus* (ringworm of the body), *T. tonsurans* (ringworm of the scalp), and *T. sycosis mentis* (ringworm of the beard). 2. The *Tricophyton sporuloides*, which, together with the above, is present in the disease known as *Plica Polonica*. 3. The *Achorion Schönleini* and *Puccinia* fern, which are present in *T. favosa*, known also as *Furra* (q. v.), and *Porrius scutellata* (the honeycomb ringworm). 4. The *Microsporon mentagrophyta*, which is present in *Alopecia*. 5. The *Microsporon furfur*, which occurs in *Pityriasis versicolor*. 6. The *Microsporon Audouini*, which is present in *Porrius scutellata*. 7. The *Mycetozoa* or *Chionophye Carteri*, which gives rise to the disease known as the 'mange loot of India,' &c. 8. The *Oidium albicans* of dysphtheria and aphtha. 9. The *Cryptococcus Cerevisiae*, or *Yeast Plant*, occurring in the urine and

contents of the stomach, if there is saccharine fermentation. 10. The *Sarcina Goodierii*, or *Merisporidia ventriculi* (of Robin), found in vomited matters and in the urine. There are strong grounds, based partly on botanical and partly on clinical observation, for believing that the various fungi already described are mere varieties of two or more species in various phases of development.

We shall conclude this article with a brief notice of the most dangerous of all the parasitic diseases—the *Fungus Foot* or *Fungous Disease of India*. It occurs in many parts of India, and the north-east shores of the Persian Gulf. It is a disease which occurs among natives only, so far as has been yet observed, and is undoubtedly due to the presence of a fungus which eats its way into the bones of the foot and the lower ends of the tibia and fibula, penetrating by numerous fistulous canals through the tissue of the entire foot, and tending to cause death by exhaustion, unless amputation is performed in due time. Dr Carter has described three forms of this disease, in which both the symptoms and the fungoid material differ considerably from each other. A few remarks on the first of these forms will suffice as an illustration of parasitic disease. In this form, the bones of the foot and the lower ends of the leg-bones are perforated in every direction with roundish cavities, varying in size from that of a pea to that of a pistol-bullet, the cavities being filled with the fungoid matter. The surrounding muscles, and subsequently the tendinous and fatty structures, are converted into a gelatiniform mass, in consequence of which the foot presents a peculiar turgid appearance. The structure of the globular fungoid masses is shown in the accompanying figure, which was

drawn by Dr H. J. Carter from a specimen which he examined immediately after amputation. Examined under the microscope, the fungoid mass is found to consist of short, beaded, tawny threads or filaments, arising from a common centre, and having at their tips large spore-like cells. For further information regarding this remarkable form of disease, the reader is referred to Dr Carter's paper in the fifth volume (new series) of the *Transactions of the Medical and Physical Society of Bombay*, and to the Rev. M. J. Berkeley's account of his examination of the fungus, in the second volume of *The Intellectual Observer*, p. 248.

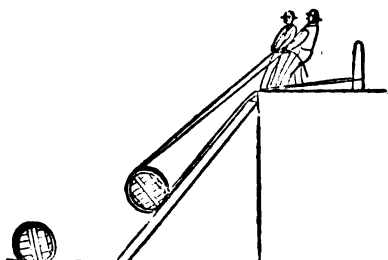
Further notice of the parasitic diseases of the skin will be found in the articles *PITYRIASIS* (var. *versicolor*), *RINGWORM*, *SCALD-HEAD*, &c.

PARASITIC PLANTS are plants which grow on other plants, and derive subsistence from their juices; the plants which live parasitically on animal tissues being generally called *Entophytes* (q. v.), although the distinction between these terms is not always preserved. *Epiphytes* (q. v.) differ

from parasitical plants in not subsisting on the juices of the plant which supports them, but merely on decayed portions of its bark, &c., or drawing all their nourishment from the air. Parasitical plants are numerous and very various; the greater number, however, and the most important, being small fungi, as Rust, Brand, Bunt, Smut, &c., the minute spores of which are supposed, in some cases, to circulate through the juices of the plants which they attack. Concerning some minute fungi, as the Mildews, it is doubted if they are truly parasitical, or if their attacks are not always preceded by some measure of decay. But among parasitic plants are not a few phanerogamous plants, some of which have green leaves; and some are even shrubby, as the Mistletoe, Loranthus, &c.; whilst the greater number have brown scales instead of leaves, as Dodder, Broom-rape, Lathræa, &c., and the whole of that remarkable order or class of plants called *Rhizanthææ* or *Rhizogæna*, of which the genus *Rafflesia* is distinguished above all other plants for the magnitude of its flowers. Some parasitic plants, as the species of Dodder, begin their existence by independent growth from the ground; but when they have found suitable plants to take hold of and prey on, the connection with the ground ceases. Not a few, as Broom-rape and Lathræa, are root-parasites, attaching themselves only to the roots of other plants, generally of trees or shrubs; whilst there are some, as the Eyebright (*Euphrasia officinalis*), Yellow Rattle (*Rhinanthus crista galli*), Cow-wheat (*Melampyrum arvense*), &c., which are parasitical only occasionally and partially, preying on the roots of other herbaceous plants in their vicinity. These last are chiefly common on neglected grass lands, and are generally to be regarded as injurious weeds. Root-parasites generally attach themselves by means of little tubercles, which gradually bury themselves under the bark.

PARASOL (from the Ital. *parare*, to parry or keep off, and *sole*, the sun), a small umbrella used by ladies to shade themselves from the sun.

PARBUCKLE is a mode of drawing up or lowering down an inclined plane any cylindrical object, as a barrel or a heavy gun, without the aid of a crane or tackle. It consists in passing a stout rope round a post or some suitable object at the top of the incline, and then doubling the ends under



Parbuckle.

and over the object to be moved. This converts the cask or gun into a pulley in its own behalf, and limits the pressure at each end of the rope to one-fourth the weight of the object moved, as felt on the incline. By hauling in the ends equally, the cask ascends, or *vice versa*.

PARCÆ (from the root *pars*, a part), the name given by the Romans to the goddesses of Fate or Destiny, who assigned to every one his 'part' or lot. The Greek name, *Moiræ*, has the same meaning (from *meros*, a share). They are only once

mentioned by Homer, who in every other instance speaks of Fate (*Moiræ*) in the singular, and whose Fate was not a deity but a mere personification, the destinies of men being made by him to depend upon the will of the gods; whilst, according to the later Greeks and the Romans, the gods themselves were subject to the control of the *P.* or *Moiræ*. Hesiod, however, who is almost contemporary with Homer, speaks of three Fates, whom he calls daughters of Night—Clotho, the spinner of the thread of life; Lachesis, who determines the lot of life; and Atropos, the inevitable. They were usually represented as young women of serious aspect; Clotho with a spindle, Lachesis pointing with a staff to the horoscope of man on a globe, and Atropos with a pair of scales, or sun-dial, or an instrument to cut the thread of life. In the oldest representations of them, however, they appear as matrons, with staffs or sceptres. They had places consecrated to them throughout all Greece, at Corinth, Sparta, Thebes, Olympia, &c.

PARCELS, in the law of England, is the technical word describing the piece of land or premises included in a conveyance.

PARCENER. See **COPARCENER**.

PARCHIM, a town of the grand-duchy of Mecklenburg-Schwerin, stands on the Elde, which is here divided into two arms, 23 miles south-east of Schwerin. It is very old, is irregularly built, surrounded by beautiful gardens, and has a gymnasium and two churches. Pop. 6672, who are employed in agriculture, in the manufacture of tobacco, cloth, leather, and brandy, and in weaving.

PARCHMENT, one of the oldest inventions of writing materials, was known at least as early as 500 years B.C. Herodotus speaks of books written upon skins in his time. Pliny, without good grounds, places the invention as late as 196 B.C., stating that it was made at Pergamos (hence the name *Pergamena*, corrupted into Eng. parchment) in the reign of Eumenius II., in consequence of Ptolemy of Egypt having prohibited the exportation of papyrus. Possibly the Pergamian invention was an improvement in the preparation of skins which had certainly been used centuries before. The manufacture rose to great importance in Rome about a century B.C., and soon became the chief material for writing on; and its use spread all over Europe, and retained its pre-eminence until the invention of paper from rags, which from its great durability proved a fortunate circumstance for literature.

There are several kinds of parchment, prepared from the skins of different animals, according to their intended uses. The ordinary writing parchment is made from those of the sheep and of the she-goat; the finer kind, known as *vellum*, is made from those of very young calves, kids, and lambs; the thick common kinds, for drums, tambourines, battle-dores, &c., from those of old he-goats and she-goats, and in Northern Europe from wolves; and a peculiar kind is made from asses skins, the surface of which is enamelled. It is used for tablets, as blacklead writing can be readily removed from it by moisture. The method of making parchment is at first the same as in dressing skins for leather. The skins are limed in the lime-pit until the hair is easily removed. They are then stretched tightly and equally, and the flesh side is dressed as in currying, until a perfectly smooth surface is obtained. It is next ground by rubbing over it a flat piece of pumice-stone, previously dressing the flesh side only with powdered chalk, and slaked lime sprinkled over it. It is next allowed to dry, still tightly stretched on the frame. The drying process is an

important one, and must be rather slowly carried on for which purpose it must be in the shade. Sometimes these operations have to be repeated several times, in order to insure an excellent quality, and much depends upon the skill with which the pumice-stone is used, and also upon the fineness of the pumice itself. When quite dried, the lime and chalk are removed by rubbing with a soft lamb-skin with the wool on.

PARCHMENT, VEGETABLE. This remarkable substance was made known by Mr. W. E. Gaine in 1854, and again by the Rev. J. Barlow in 1857. It resembles animal parchment so closely, that it is not easy to distinguish the difference. It is made from the water-leaf, or unazed paper, by immersing it only for a few seconds in a bath of oil of vitriol, diluted with one-half its volume of water. The exactness of this dilution is of the greatest importance to the success of the results. The dilute acid must not be used immediately after mixing, but must be suffered to cool to the ordinary temperature; without attention to these apparently trifling points, the operator will not succeed.

The alteration which takes place in the paper is of a very remarkable kind. No chemical change is effected, nor is the weight increased, but it appears that a molecular change takes place, and the material is placed in a transition state between the cellulose of woody fibre and dextrin.

Vegetable parchment has become a regular article of trade, and legal and other documents are engrossed upon it. In some respects it is preferable to the old kind, for insects attack it less. It is admirably adapted for engineers' plans, as it can be made so thin as to be used for tracing paper, and it will bear exposure to wet without injury. Messrs De la Rue are entitled to the credit of giving practical effect to the invention.

PARÉ, AMBROISE, a renowned French surgeon, and the father of modern surgery, was born about the beginning of the 16th c., at Laval, department of Mayenne, France. His father, who was a trunk-maker, was unable to afford him a literary education, and apprenticed him to a barber and surgeon. P., after a brief term of service, acquired such a fondness for surgery and anatomy, that, abandoning his master, he went to Paris to prosecute his studies. His means for doing so were very limited; he could afford to obtain instruction from only the more obscure teachers; few books were within his reach, yet by dint of perseverance and the exercise of a rare discrimination, combined with the valuable practice in the Hôtel de Dieu of Paris, he laid a solid foundation for future eminence. In 1536, P. was received as a master barber-surgeon, and joined in this capacity the army of Marshal René de Monte-Jean, which was on the point of starting for Italy. During this campaign he improved the mode of treatment of gun-shot wounds, which had up to this time been of the most barbarous kind—namely, cauterisation with boiling oil. His reputation as well as his skill were greatly heightened during this campaign, and as he himself says: 'If four persons were seriously wounded I had always to attend three of them; and if it were a case of broken arm or leg, fractured skull, or fracture with dislocation, I was invariably summoned.' In 1539, he returned to Paris, whither his high renown had preceded him, and was received with distinction by the Royal College of Surgery, of which he was subsequently appointed president. On the war being renewed, he was again attached to the army, under the Viceroy de Rohan, afterwards under Antoine de Bourbon, Duke of Vendôme. It was during this

campaign that he cured François, the second Duke of Guise, of the wound which conferred upon him the sobriquet of *Balafré*, and that he substituted ligature of the arteries for cauterisation with a red-hot iron after amputation. The idea of this mode of repressing hemorrhage had long been in existence, but he was the first to shew that it could safely be applied to practice. Many other important improvements in surgery were introduced by him at this time. In September 1552 he was appointed surgeon to King Henry II., and in the following year was taken prisoner at Hesdin; he was however released, in consideration of his having cured Colonel de Vaudeville, after rejecting the brilliant offers made him by the Duke of Savoy to remain in his service. Returning to Paris, honours were showered upon him; and though he was ignorant of Latin, the *conditio sine qua non* of a liberal education at that time, no hesitation was shewn in conferring upon him learned titles and degrees. He attended Francis II. on his death-bed, and continued to hold the office of king's surgeon to his successors, Charles IX. and Henry III. The former of these monarchs, whose life had been gravely threatened by an injury inflicted by his physician Forail, and who had been preserved by P., testified for him the greatest esteem, and saved him during the massacre of St Bartholomew by locking him up in his own chamber. During the latter part of P.'s life, he was much employed in the publication of his various writings, and suffered considerable annoyance from the envious spirit displayed towards him by his professional brethren, who showered obloquy upon him for having, as they said, 'dishonoured science by writing in the vulgar tongue.' P. died at Paris, December 22, 1590. His writings have exercised a great influence on the practice of surgery in all countries to which they have penetrated, and are held of the highest authority on the subject of gun-shot wounds. The first complete edition of them appeared at Lyon in 1562, and the last, edited by M. Malgaigne, at Paris (1840—1841, 3 vols.). Besides these are 8 Latin editions, and more than 15 translations into English, Dutch, German, &c. As an instance of his great popularity in the army, it may be mentioned that the soldiers of the garrison of Metz, of their own accord, gave him a triumphal reception on his entering that town.

PAREGORIC, or PAREGORIC ELIXIR (from the Gr. *parégoricos*, soothing), the *Compound Tincture of Camphor* of the London, and the *Camphorated Tincture of Opium* of the British Pharmacopœia, consists of an alcoholic solution of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing two grains each of opium and benzoic acid, and a grain and a half of camphor. This preparation is much used both by the profession and the public. In doses of from one to three drachms, it is an excellent remedy for the chronic winter-cough of old people, the opium diminishing the bronchial secretion and the sensibility of the pulmonary mucous membrane, while the benzoic acid and oil of anise act as stimulating expectorants. It has also been found useful in chronic rheumatism.

PAREIRA-BRAVA. See CISSAMPLOS.

PARELLA (Fr. *parelle* or *perelle*), a name often given to some of those crustaceous lichens which are used to produce Archil, Cudbear, and Litmus; but which more strictly belongs to one species, *Lecanora parella*, resembling the Cudbear Lichen, but with somewhat plaited warty crust, and shields (*apothecia*) having a concave disk of the same colour as the thick tumid even border. Like the Cudbear

Lichen—to which it is far superior in the quality of the dye-stuff obtained from it—it grows on rocks in mountainous districts both in Britain and on the continent of Europe, being particularly abundant in Auvergne and other parts of France.

PARENCHYMA. See **CELLULAR TISSUE.**

PARENT AND CHILD. The legal relation between parent and child is one of the incidents or consequences of the relation of husband and wife, and flows out of the contract of marriage. The legal is to be distinguished from the natural relation, for two persons may be by the law of nature parent and child, while they are not legally or legitimately so. Hence a radical distinction exists between natural or illegitimate and legitimate children, and their legal rights as against their parents respectively are very different. Legitimate children are the children of two parents who are recognised as married according to the laws of the country in which they are domiciled at the time of the birth; and according to the law of England, if a child is illegitimate at the time of the birth, nothing that can happen afterwards will ever make it legitimate, the maxim being 'once illegitimate always illegitimate'—a maxim which, as will be stated, has some exceptions in Scotland. In treating of the laws affecting the mutual relation of parent and child, the laws of England and Ireland, which differ from the law of Scotland in material respects, will first be stated.

1. *As to Legitimate Children.*—These laws relate first to the liability of the parent to maintain the child, and the rights of the child in the event of the parent's death. As regards the maintenance of the child, it is somewhat singular that, according to the law of England, there is no duty whatever on the parent to support the child, and consequently no mode of enforcing such maintenance. The law of nature was probably considered sufficient to supply the motives which urge a parent to support the child, but the municipal law of England has not made this duty compulsory. This defect was to some extent remedied when what is called the Poor-Law was created by statute in the reign of Elizabeth, by which law parents and children are compellable to a certain small extent, but only when having the pecuniary means to do so, to support each other, or rather to help the parish authorities to do so. But apart from the Poor-Law statutes, there is no legal obligation on the parent to support the child, nor on the child to support the parent. Hence it follows, that if the child is found in a destitute state, and is taken up, fed, clothed, and saved from starvation by a stranger, such stranger cannot sue the parent for the expense, or any part of it, however necessary to the child's existence. In order to make the father liable for maintenance, there must in all cases be made out against him some contract, express or implied, by which he undertook to pay for such expense; in other words, the mere relationship between the parent and child is not of itself a ground of liability. But when the child is living in the father's house, it is always held by a jury or court that slight evidence is sufficient of, at least, an implied promise by the father to pay for such expenses. As, for example, if the child orders clothes or provisions, and the father sees these in use or in process of consumption, it will be taken that he assented to and adopted the contract, and so will be bound to pay for them. So if a parent put a child to a boarding-school, very slight evidence of a contract will be held sufficient to fix him with liability. Nevertheless, in strictness of law, it is as necessary to prove a contract or agreement on the part of the parent to pay for these expenses as it is

to fix him with liability in respect of any other matter. When it is said that a parent is not compellable by the common law to maintain his child, it must, at the same time, be observed that if a child is put under the care and dominion of an adult person, and the latter wilfully neglect or refuse to feed or maintain such child, whereby the child dies or is injured, such adult will incur the penalties of misdemeanour; but this offence does not result from the relationship of parent and child, and may arise between an adult and child in any circumstances, as where a child is an apprentice or servant. The change as to the liability of parents to maintain their children created by the Poor-Laws amounts merely to this, that if a person is chargeable to the parish, which means that such person is utterly destitute, and if the overseers or guardians are bound to support him or her, then the parish authorities may reimburse themselves this outlay, or part of it, by obtaining from justices of the peace an order commanding the parent or child of such pauper to pay a certain sum per week towards the relief. This is, however, only competent when the relative is able to pay such sum, and in all cases the sum is of necessity very small. Not only parents, but grand-parents, are liable under the Poor-Law Act to the extent mentioned. Another provision in the Poor-Law and other kindred acts is, that if a parent runs away and deserts his children, leaving them destitute and a burden on the parish, the overseers are entitled to seize and sell his goods, if any, for the benefit and maintenance of such children; and if the parent, so deserting the children, is able by work or other means to support them, such parent may be committed to prison as a rogue and vagabond. Not only, therefore, is a parent during life not bound to maintain his or her child (with the above exceptions), but also after the parent's death the executors or other representatives of the parent, though in possession of funds, are not bound. It is true that if the parent die intestate, both the real and personal property will go to the children; but the parent is entitled, if he choose, to disinherit the children, and give away all his property to strangers, provided he execute his will in due form, which he may competently do on death-bed if in possession of his faculties.

Another important point of law, affecting the mutual relation of parent and child, is the right of the parent to the custody of the child. At common law it is the father who has the right to the custody of the child until majority at least, as against third parties, and no court will deprive him of such custody except on strong grounds. Whenever the child is entitled to property, the Court of Chancery so far controls his parental right, that if the father is shewn to act with cruelty, or to be guilty of immorality, a guardian will be appointed. A court of common law also has often to decide in cases of children brought before it by *habeas corpus*, when parties have had the custody against the father's will. In such cases, if the child is under fourteen, called the age of nurture, and the father is not shewn to be cruel or immoral, the court will order the child to be delivered up to him; but if the child is above fourteen, or, as some say, above sixteen, the court will allow the child to choose where to go. So the father is entitled by his will to appoint a guardian to his children while they are under age. The mother had, at common law, no right as against the father to the custody of the children, however young; but under Talfourd's Act (2 and 3 Vict. 54), she is entitled to the custody of the child while under seven years of age, or rather she is entitled to apply to the Court of Chancery for leave to keep the children while under that age, provided she is

such child is male or female. At the age of 14, a boy, and at 12, a girl, in Scotland, is entire master or mistress of his or her movements, and can live where he or she pleases, regardless of any parent or court. They can marry at that age at their own uncontrolled discretion, and act in all respects with the same freedom as adults. As regards the disposition of their property there are some restrictions, but as regards the disposal of their persons there are none, after the ages of 14 and 12 respectively.

2. *Illegitimate Children*.—The law of Scotland as to illegitimate children also differs in some respects from that of England. Both the father and mother of a bastard are bound by law to support such child, and the obligation transmits to the personal representatives of the father or mother. Moreover, by the Poor-Law statute both are liable to a penalty for neglecting to support the child. The mother of illegitimate children is entitled to their custody till the age of ten, if daughters, and if sons, till the age of seven; but the limit is not clearly defined. If the father support the child after the above age, he is entitled to the custody. The mother does not apply to a magistrate for a summons of affiliation in order to fix the paternity; but she may bring an action of filiation and aliment, in which the question of paternity is settled. The father may be judicially examined, and is a competent witness; and it is usual for the court to decree an aliment, varying from £4 per annum against labourers, up to £10 against persons in better circumstances. In Scotland, as in England, the father of a bastard child is not deemed related, in point of law, to such child; and if he desires to provide for such child, it must be done by deed or will, in which the child is identified, and not merely described under the general designation of 'child,' which he is not.

PARENTHESIS, a term originally Greek, and signifying *insertion* or *intercalation*, is in composition a clause, or part of a sentence or argument, not absolutely essential to the sense, but generally serving either for explanation or confirmation, sometimes chiefly for rhetorical effect. A parenthesis is usually included between the marks (), instead of which the *dash* (—) at the beginning and end of the parenthesis is frequently but improperly employed.

PARIAH DOG. See **CUR**.

PARIAN. See **POTTERY**.

PARIAN CHRONICLE. See **ARUNDEL MARBLES**.

PARIAS is the name given to the lowest class of the population of India—to that class which, not belonging to any of the castes of the Brahminical system, is shunned even by the lowest Hindu professing the Brahminical religion, as touching a Paria would render him impure. The P. seem to belong to a negro race, as appears from their short woolly hair, flat nose, and thick lips; they are, besides, of short stature, and their propensities are of the coarsest kind. Despised by the Hindus, and ill used by the conquerors of India, they have, in some parts of India, gradually sunk so low that, to judge from the description which is given of their mode of living by different writers, it is scarcely possible to imagine a more degraded position than that which is occupied by these miserable beings.

PARIDÆ AND PARUS. See **TIT**.

PARING AND BURNING consists in cutting off the surface of the soil in thin slices, which are then dried and burned. This is the most effectual way of reclaiming peat and other waste land, the surface of which is matted with coarse plants, difficult of decay. It is also applied advantageously

to cold clay soils, apt to produce rank weeds and coarse grasses, which are to be broken up after lying for some time in grass. The ashes of the plants, consisting of potash and other salts, act as a powerful manure; while the clay being reduced to the state of brick-dust, both improves the texture of the soil, and acts as an absorbent for retaining moisture and nutritive gases, and giving them out to the roots of growing plants. On thin light soils the operation is rarely advisable, for much of the scanty volatile vegetable matter is dissipated; however if care is taken to make the turfs merely smoulder without flame, so that the plants are rather charred than burned, it is doubtful whether more dissipation takes place than if the plants were ploughed down, and allowed slowly to decay. The plot to be reclaimed should, if necessary, be dried by stone or tile drains; and all large stones grubbed up, and carted or conveyed off upon sledges. The paring is to be done, if possible, in the months of April and May, in order to have the most favourable part of the year for drying the parings well before burning. There are ploughs specially made for paring, with a very flat share; but the best method is to employ the *breast-plough* or *paring-spade*, as the surface is in most cases very irregular, and it is desirable to have the slices very thin. The parings should be burned directly they are sufficiently dry, as, after lying a month or six weeks, they begin to unite with the ground, and imbibe moisture from the young grass vegetating beneath them. Sometimes they can be burned as they lie, without being collected into heaps; and in this way, the fire, in consuming the lingly side, which is undermost, chars the surface of the soil at the same time. If burned in heaps, the heaps should be very small, in order to secure a good black ash, instead of the hard lumps of red ash produced by large fires. The weeds or refuse organic matters are thus only charred, instead of being entirely burned away; whilst the mineral matters are left in a soluble state instead of being reduced, as is too apt to be the case where the operation is carelessly conducted, into an insoluble semi-vitrified slag. To attain these desirable results a smouldering fire must be maintained, by keeping the outside layer of sods so close as to prevent the fire from kindling into flame. The ashes should be spread, care being taken to clear the bottoms of the heaps well out, so that the first crop may be free from patches. The cost of this paring, burning, and spreading is about £1 per acre.

PARIS, a genus of plants of the small endogenous or dictyogenous natural order *Trilliaceæ*, of which one species, *P. quadrifolia*, called **HERB PARIS**, is not uncommon in moist shady woods in some parts of Britain. It is rarely more than a foot high, with one whorl of generally four leaves, and a solitary flower on the top of the stem, followed by a berry. The berry is reputed narcotic and poisonous, but its juice has been employed to cure inflammation of the eyes. The root has been used as an emetic.

PARIS, also called **ALEXANDER**, was, according to Homer, the second son of Priam and Hecabe, sovereigns of Troy. His mother dreamed during her pregnancy that she gave birth to a firebrand, which set the whole city on fire, a dream interpreted by Æscas or Cassandra to signify that P. should originate a war which should end in the destruction of his native city. To prevent its realization, Priam caused the infant to be exposed upon Mount Ida by a shepherd named Agelaus, who found him, five days after, alive and well, a she-bear having given him suck. Agelaus brought him up as his own son, and he became a shepherd on Mount Ida,

however, for Napoleon III. to render P. a thoroughly modern city. Under his rule, P. may be said to have been almost rebuilt. Streets are widened and beautified, and new and spacious thoroughfares are opened up through old and densely-built districts; in which, and numerous other undertakings, the emperor has set an example for the whole of Europe. In the present day, chiefly through his policy, P. excels in comfort and beauty all the cities in the world, and has accordingly become a centre of universal attraction.

Before going into details, it is proper to mention that P. is a city built of a light-coloured kind of limestone, easily wrought and carved ornamentally. With this material, the houses are reared in huge blocks, rising to a height of six or seven stories; each floor constituting a distinct dwelling; access to all the floors in a tenement being gained by a common stair, which is usually placed under the charge of a porter at the entrance. Very frequently, the tenements surround an open quadrangle, to which there is a spacious entry, the gate of which is kept by a porter for the whole inhabitants of the several stairs. In these respects, therefore, P. differs entirely from London; for instead of extending rows of small brick buildings of a temporary kind over vast spaces, the plan consists of piling durable houses on the top of each other, and confining the population to a comparatively limited area. Whether this device, which is adapted to the gregarious character of the French, could be successfully applied in London, remains uncertain.

Of the bridges (about 30 in number) which now span the river, 8 have been constructed since 1852, and several of the others rebuilt or repaired during the reign of the present emperor. The most celebrated and ancient are the Pont Notre-Dame, erected in 1500, and the Pont-Neuf, begun in 1578, completed by Henri IV. in 1604, and thoroughly renovated in 1852. This bridge, which crosses the Seine at the north of the Ile-de-la-Cité, is built on 12 arches, and abuts near the middle on a small peninsula, jutting out into the river, and planted with trees, which form a background to the statue of Henri IV. on horseback, which stands in the central open space on the bridge. Among the other bridges, the handsomest are, the Pont de la Concorde, 160 yards long, built in 1787—1790; the Pont du Carrousel, with its colossal allegorical figures at each end; Pont d'Austerlitz and Pont d'Jéna, both of the time of the First Empire; and the Pont des Invalides, Pont de l'Alma, and Pont de Solferino—all handsome structures, adorned with military and naval trophies, commemorative of events and victories connected with the present dynasty. These bridges all communicate directly with the spacious quays, planted with trees, which line both banks of the Seine, and which, together with the Boulevards, give special characteristic beauty to the city. Although the most ancient quays—as those des Augustins and de la Mégisserie—date from the 14th c., the greater part of these magnificent embankments, measuring 12 miles in extent, is due to the first Napoleon and the present emperor. The Boulevards, of which there are 22, and which extend in a semicircular line on the right side of the Seine, between the nucleus of the city and its surrounding quarters, present the most striking feature of Paris life. In all the better parts of the city they are lined with trees, seats, and little towers called *Vespasiennes*, covered with advertisements. Restaurants, cafés, shops, and various places of amusement succeed one another for miles, their character varying from the height of luxury and elegance in

the western Boulevard des Italiens, to the homely simplicity of the eastern Boulevards Beaumarchais and St Denis, where, however, the old character of squalor and villany, for which the streets and inhabitants were noted, has nearly disappeared under the thorough renovations of the present reign. The Porte St Martin and Porte St Denis, which were erected by Louis XIV. to commemorate his victories in the Low Countries, and are adorned with bas-reliefs representing events of these campaigns, mark the ancient limits of the most turbulent quarters of the Paris of the past, while the Arc de l'Etoile, begun by Napoleon in 1806, and completed in 1836 at a cost of more than £400,000, may be said to form the extreme western boundary of the aristocratic quarters. This arch, which bounds the Champs-Élysées, and has the reputation of being the largest in the world, has a total height of 152 feet and a breadth of 137. It is profusely adorned with bas- and alto-reliefs, representing the career and victories of Napoleon; and from its position, at the end of the noble avenue of the Champs-Élysées, forms a grand terminal vista to the Tuileries. P. has 1300 streets, many of which, in the central parts, are narrow and crooked, without side-pavements, and often dark from the height of the houses, which have from four to seven stories. This is especially the case in the eastern quarters on the left bank of the Seine, where there are labyrinths of dirty, winding streets. In accordance with the plan of the improvements designed during the present reign, wide, long streets are, however, everywhere gradually penetrating through the intricate network of narrow passages which, until recently, were to be met with in the north and east parts of the city, and thus opening direct communication between the centre and extremities of Paris. The finest streets are the Rue de Rivoli, two miles in length, Rue de la Paix, Rue du Faubourg St Honoré, Rue Royale, &c. Among the public squares, or *places*, of which there are upwards of 100, the most noteworthy is the Place de la Concorde, one of the finest squares in Europe, which connects the Gardens of the Tuileries with the Champs-Élysées, and embraces a magnificent view of some of the finest buildings and gardens of Paris. In the centre is the famous obelisk of Luxor, covered over its entire height of 73 feet with hieroglyphics. On the site of this obelisk stood the revolutionary guillotine, at which perished Louis XVI., Marie Antoinette, Philippe Egalité, Danton, Robespierre, and a host of other victims. Of the other squares, the following are some of the most handsome: the Place du Carrousel, between the Tuileries and Louvre; Place Vendôme, with Napoleon's Column of Victory; Place de la Bastille, where once stood that famous prison and fortress; Place Royale, with its two fountains and a statue of Louis XIII.; Place de l'Hôtel de Ville, formerly Place de la Grève, for many ages the scene of public executions, and the spot at which some of the bloodiest deeds of the Revolution were perpetrated.

Among the parish churches of P. (upwards of 60 in number), the grandest and most interesting, in an historical point of view, is the cathedral of Notre-Dame, which stands on a site successively occupied by a pagan temple and a Christian basilica of the time of the Merovingian kings. The present building was constructed between the 12th and 15th centuries, and in its present state of restored magnificence it may rank as one of the noblest specimens of Gothic architecture. It is of a regular cruciform shape, with an octagonal east end, two flanking towers with flying buttresses, and a new central spire, remarkable, like every other part, for its delicate and

requiring from eight to ten years for their completion. The tapestries are retained by the government for the decoration of palaces at home, or are presented to foreign sovereigns. The Bourse or Exchange, built in 1808, and the Bank of France, once a private palace, are both fine buildings. P. abounds in theatres and places of amusement suited to the tastes and means of every class. The leading houses, as the Opéra, Théâtre Français, chiefly devoted to classical French drama, Odéon, Théâtre Italien, &c., receive a subvention from government, and all are under strict police supervision. Cheap concerts, equestrian performances, and public balls, held in the open air in summer, supply a constant round of gaiety to the burgher and working-classes at a moderate cost, and form a characteristic feature of P. life; while in addition to the noble gardens of the various imperial palaces, the most densely-crowded parts of the city have public gardens, shaded by trees, and adorned with fountains and statues, which afford the means of health and recreation to the poor.

Vast improvements, as already stated, have been made in the city from 1853 to the present time (1864). Within these recent years, the Boulevard de Sébastopol—opening up the most populous and most unhealthy district of P., a district formerly the hotbed of disturbance—has been erected at the cost of about £3,000,000. Several central markets have also been constructed; the Rue Rivoli has been prolonged, and a boulevard in commemoration of the visit of Queen Victoria has been erected between the Hôtel de Ville and the Place du Châtelet. A convention between the state and the city of P., ratified 28th May 1858, guarantees that within ten years from that date 9 new boulevards and 10 new streets shall be erected, old streets joined and levelled, and 4 new avenues formed. From the 1st October 1862 to 30th September 1863, 2943 new buildings had been erected in Paris. While the sums spent in the improvement and ornamentation of the city have largely increased, the municipal revenues have also been rapidly enlarged within recent years.

P. has three large and twelve lesser cemeteries, of which the principal one is Père-la-Chaise, extending over 200 acres, and filled in every part with monuments erected to the memory of the countless number of celebrated persons who have been buried here. The Morgue is a building in which the bodies of unknown persons who have met with a violent death are placed, and which, if not claimed within three days, are buried at the public expense.

P. was surrounded under Louis-Philippe with fortifications, extending 30 miles round, and costing £5,500,000 sterling, and in addition to these, 16 detached forts have been erected at definite distances from one another. The 50,000 men usually garrisoned within and around P. are quartered in 30 barracks, within the line of fortifications. Besides these troops, the city has a national guard, numbering about 40,000 men, in which all citizens between 25 and 50 are liable to be called into service. The Arsenal is situated near the site of the old Bastille. The Champ-de-Mars is a vast sandy plain, near the Quai d'Orsay, on which reviews and other military displays and national festivals are held. Close to it stands the Ecole Militaire, founded in 1752, and now used as a military training-school for infantry and cavalry, of which it can accommodate 10,000 men, with space for 800 horses. The Hôtel des Invalides, founded in 1670, for disabled soldiers, is an admirable institution, situated on the left bank of the river. It can receive 8000 men, but the number of the inmates is generally much less, and consists

both of officers and non-commissioned officers; all soldiers who have been seriously wounded, or who have served 30 years, being entitled to admission. The library, museum, and chapel are full of objects of interest, and every part of the building is filled with mementoes of the wars and victories of France. The crypt of the church contains the sarcophagus hewn from a huge block of Russian granite, in which lie the remains of Napoleon, deposited here in 1840.

P. is divided into 20 *arrondissements*. The prefect of the Seine is the chief of the municipal government, aided by a council of 36 members, appointed, as he is himself, by the government. The civic revenues amount for the present year (1864) to 151,408,942 francs, or £6,002,931, more than one-half of which is drawn from the octroi or city dues. Each *arrondissement* has a mayor and two assistant councillors. The prefect of police is at the head of the civic guard or *gensdarmes*, of 4400 men; the fire-brigade of 1800 men; and the *sergents de ville*, or city police, numbering 3570 men, who are armed with a sword. According to statistical reports, there are 60,000 persons belonging to the criminal class, of whom one third are women, at large in P., but known to the police. The cleaning, sewerage, and water supplies of P. are under the charge of the prefect. The dirt and sewerage are conveyed to large reservoirs, known as the *Voirie de Bonny*, where, after three years' interval, they are sold for manure, while numerous scavengers are employed in sweeping the great thoroughfares several times daily, although the less frequented or humbler streets are still much neglected. P. is now abundantly supplied with pure and wholesome water; the drainage is also being improved—since 1854, the length of vaulted sewers has been doubled, and now amounts to upwards of 250 miles. The same may be said in regard to the paving of the city, and the street-lighting is now adequately effected by means of some 15,000 gas-lights. In 1818 public slaughter-houses, or *abattoirs*, were established at different suburbs, where alone animals are allowed to be slaughtered. Large cattle-markets are held near the licensed *Abattoirs* (q. v.). There are in the heart of the city numerous *halles*, or wholesale, and *marchés*, or retail markets. The principal of these is the Halles Centrales, near the Church of St Eustache, now in process of completion, and covering nearly 20 acres. According to strictly-enforced police regulations, no carcasses or pieces of meat are allowed to be carried openly about and ostentatiously exhibited, as is the very offensive practice about Newgate Street, in London; neither are butchers allowed to shew themselves in the dress of the *abattoirs*. Among the older markets, the Halle aux Vins, in which 500,000 casks of wine can be stowed, and the *Marché aux Fleurs*, are perhaps the most interesting; the latter presenting on a summer's morning one of the most charming sights of Paris. On the whole P., as now constituted and regulated, offers an important subject of study to the social economist, and all generally who are interested in the arrangement of great cities.

PARIS BASIN, the collective name of the beds of Eocene age, which rest in a hollow of the chalk in the district around Paris, where they occupy an oblong area measuring 180 miles in greatest length from north to south, and 90 miles in breadth from east to west. The different sections into which the series has been divided are given under Eocene (q. v.). The beds are chiefly remarkable for the rich harvest of organic remains which they supplied to Cuvier, and which led to the foundation of the modern science of Paleontology. The strata from which

difficulty has occasionally arisen in fixing the boundaries of parishes. Blackstone says the boundaries of parishes were originally ascertained by those of manors, and that it very seldom happened that a manor extended itself over more parishes than one, though there were often many manors in one parish. Nevertheless, the boundaries of parishes are often intermixed, which Blackstone accounts for by the practice of the lords of adjoining manors obliging their tenants to appropriate their tithes towards the officiating minister of the church, which was built for the whole. Even in the present day, these boundaries often give rise to litigation, and the courts have always decided the question according to the proof of custom. This custom is chiefly established by the ancient practice of perambulating the parish in Rogation-week in each year. See PERAMBULATION. There are some places as to which it is uncertain whether they are parishes or not, and hence it has been usual to call them reputed parishes. There are also places called extra-parochial places, which do not belong to any parish, such as forest and abbey lands. In these cases, the persons inhabiting were not subject to the usual parochial rates and taxes, and other incidents of parochial life. But in 1857, a statute was passed which put extra-parochial places upon a similar footing to parishes, by giving power to justices, and in some cases to the Poor-law Board, to annex them to adjoining parishes, after which they are dealt with in much the same way as other places. One of the chief characteristics of a parish is, that there is a parish church, and an incumbent and churchwardens attached to it, and by this machinery the spiritual wants of the parishioners are attended to. These several parish churches, and the endowments connected therewith, belong in a certain sense to the nation, and the incumbents are members of the Established Church of England, and amenable to the discipline of the bishops and the spiritual courts. The private patronage, or right of presenting a clergyman to an incumbency, is technically called an advowson, and is generally held by an individual as a saleable property, having a market value. The patron has an absolute right (quite irrespective of the wishes of the parishioners) to present a clerk or ordained priest of the church of England to a vacant benefice, and it is for the bishop to see to his qualifications. The bishop is the sole judge of these qualifications, and if he approves of them, the clerk or priest is instituted and inducted into the benefice, which ceremony completes his legal title to the fruits of the benefice. The incumbents of parish churches are called rectors, or vicars, or perpetual curates, the distinction being chiefly founded on the state of the tithes. When the benefice is full, then the freehold of the church vests in the rector or parson, and so does the churchyard; but he holds these only as a trustee for the use of the parishioners. There are certain duties which the incumbent of the parish church is bound by law to perform for the benefit of the parishioners. He is bound, as a general rule, to reside in the parish, so as to be ready to administer the rites of the church to them. See NON-RESIDENCE. The first duty of the incumbent is to perform public worship in the parish church every Sunday, according to the form prescribed by the Book of Common Prayer, which is part of the statute-law of England. He must adhere strictly to the forms and ceremonies, and even to the dress prescribed by the Book of Common Prayer and Canons. The incumbent is also bound to baptise the children of all the parishioners, and to administer the rite of the Lord's Supper to the parishioners not less than three times each

year. The incumbent is also bound to allow the parishioners to be buried in the churchyard of the parish, if there is accommodation, and to read the burial-service at each interment. He is also bound to marry the parishioners on their tendering themselves, and complying with the marriage acts, within the parish church and during canonical hours, and it is said he is liable to an action of damages if he refuse. In respect of burials and marriages, certain fees are frequently payable by custom; but unless such a custom exists, no fee is exigible for performance of these duties. In many cases, where one church had become insufficient for the increased population, the old parish has been subdivided under the Church Building Acts, the first of which was passed in 1818, into two or more ecclesiastical districts or parishes, for each of which a new church was built, and an incumbent appointed. The incumbents in these ecclesiastical parishes have generally been provided for by the incumbent of the mother-parish or by voluntary benefactors, and by the aid of pew-rents. But these ecclesiastical parishes, so far as the poor and other secular purposes are concerned, make no change on the old law. Another incident of the parish church is, that there must be churchwardens appointed annually, who are accordingly leading parochial officers, and whose duty is partly ecclesiastical and partly civil. Their civil duties consist chiefly in this, that they must join the overseers in many of the duties arising out of the management of the poor, and incidental duties imposed by statute. But their primary duty is to attend to the repair and good order of the fabric of the church. The common law requires that there should be two churchwardens, one of whom is appointed by the incumbent, and the other is chosen by the parishioners in vestry assembled, but sometimes this rule is varied by a local custom. This appointment and election take place in Easter-week of each year. In electing the people's churchwarden, there is often much local excitement, and it is common to poll the parish, all those who pay poor-rates being entitled to vote, the number of votes varying according to the rent, but no person having more than six votes. See CHURCHWARDENS; CHURCH RATES.

The next most important business connected with the parish is that which concerns the poor, the leading principle being, that each parish is bound to pay the expense of relieving its own poor. See OVERSEERS; GUARDIAN; POOR.

Another important feature of the parish is, that all the highways within the parish must be kept in repair by the parish, i.e., by the inhabitants who are rated to the poor. For this purpose, the inhabitants of each parish, in vestry assembled, appoint each year a surveyor of highways, whose duty it is to see that the highways are kept in good repair; and he is authorised, by the General Highway Act, to levy a rate on all the property within the parish. The office of a surveyor of highways is, like those of churchwarden, overseer, and guardian, a compulsory and gratuitous office. When a highway is out of repair, the mode of enforcing the repair is by summoning the surveyor of highways before justices, to shew cause why he has not repaired the road; and if the facts are not disputed, the justices either fine him, or order an indictment to be laid against the inhabitants of the parish. This indictment is tried, and the expense of it is defrayed out of the highway-rate, which is subsequently made. The highways of each parish being thus exclusively under the control of the ratepayers and their officers, it happened that great inequality prevailed in the standard of repairs which each parish set up for

to profess that he will submit to the government and discipline thereof. But he is required merely to make a declaration that he will not, in his said office, endeavour directly or indirectly to teach or inculcate opinions opposed to the divine authority of the Holy Scriptures, or to the doctrines contained in the Shorter Catechism, agreed upon by the Assembly of Divines at Westminster, and approved by the General Assembly of the Church of Scotland, and that he will not exercise the functions of his office to the prejudice or subversion of the Church of Scotland as by law established. In case of misconduct, the Presbytery may complain to the Secretary of State, who will institute a commission to inquire and report, and to censure, suspend, or deprive such schoolmaster accordingly. Formerly, the Presbytery of the Established Church had jurisdiction to prosecute and try the schoolmaster for immoral conduct, or cruel or improper treatment of the scholars, but now the sheriff of the county is the sole judge of the charge, full opportunity being given to the schoolmaster to prepare his defence. In case of sentence of suspension, the salary is to cease to be payable. The schoolmaster's house is now to consist of at least four apartments; and the heritors and minister may permit or require him to resign, and allow him a retiring allowance. With these improvements, it needs to be added, that the system of parish schools has fallen greatly short of the general requirements of the country—what was well adapted to a state of things at the Revolution, when there was a meagrely-scattered population, being out of date when the population is about three times greater. The deficiency is chiefly felt where populous manufacturing villages and towns have sprung up in rural districts. On this account, the much-boasted parochial school system of Scotland is in various quarters far behind the requirements of modern society, and but for denominational and other schools, vast numbers of children would be left without the rudiments of education.

PARK (Fr. *parc*), a term still employed in some parts of Britain, in its original sense, to denote a field or enclosure, but more generally applied to the enclosed grounds around a mansion, designated in Scotland by another term of French origin, *policy*. The park, in this sense, includes not only the lawn, but all that is devoted to the growth of timber, pasturage for deer, sheep, cattle, &c., in connection with the mansion, wherever pleasure-walks or drives extend, or the purpose of enjoyment prevails over that of economical use. *Public parks* are those in the vicinity of towns and cities, open to the public, and intended for their benefit. An increase of public parks is a pleasing feature of the present age, and not a few towns enjoy parks recently bestowed by wealthy persons somehow connected with them.

PARK, MUNGO, a celebrated African traveller, was the son of a Scottish farmer, and was born 10th September 1771 at Fowlshiels near Selkirk. He studied medicine in Edinburgh, and afterwards went to London, where he obtained the situation of assistant-surgeon in a vessel bound for the East Indies. When he returned in 1793, the *African Association* of London had received intelligence of the death of Major Houghton, who had undertaken a journey to Africa at their expense. P. offered himself for a similar undertaking, was accepted, and sailed from England 22d May 1795. He spent some months at the English factory of Pisanía on the Gambia in making preparations for his further travels, and in learning the Mandingo language. Leaving Pisanía on the 2d of December, he travelled eastward; but when

he had nearly reached the place where Houghton lost his life, he fell into the hands of a Moorish king, who imprisoned him, and treated him so roughly, that P. seized an opportunity of escaping (1st July 1796). In the third week of his flight, he reached the Niger, the great object of his search, at Sego (in the kingdom of Bambarra), and followed its course downward as far as Silla; but meeting with hindrances that compelled him to retrace his steps, he pursued his way westwards along its banks to Bammakoe, and then crossed a mountainous country till he came to Kamalia, in the kingdom of Mandingo (14th September), where he was taken ill, and lay for seven months. A slave-trader at last conveyed him again to the English factory on the Gambia, where he arrived 10th June 1797, after an absence of nineteen months. He published an account of his travels after his return to Britain, under the title of *Travels in the Interior of Africa* (Lond. 1799), a work which at once acquired a high popularity. He now married and settled as a surgeon at Peebles, where, however, he did not acquire an extensive practice; so that, in 1805, he undertook another journey to Africa, at the expense of the government. When he started from Pisanía, he had a company of 45, of whom 36 were European soldiers; but when he reached the Niger in August, his attendants were reduced to seven, so fatal is the rainy season in those regions to Europeans. From Sansanding on the Niger, in the kingdom of Bambarra, he sent back his journals and letters in November 1805 to Gambia; and built a boat, in which he embarked with four European companions, and reached the kingdom of Houssa, where he and they are believed to have been murdered by the natives, or drowned as they attempted to sail through a narrow channel of the river. The fragments of information and other evidence picked up among the natives by Clapperton and Lander (q. v.), strongly confirm this view of the fate of P. and his companions. An account of P.'s second journey was published at London in 1815. P.'s narratives are of no inconsiderable value, particularly for the light which they throw upon the social and domestic life of the negroes, and on the botany and meteorology of the regions through which he passed; but he was unfortunately cut off before he had determined the grand object of his explorations—the discovery of the course of the Niger.

PARK OF ARTILLERY is the whole train of great guns with equipment, ammunition, horses, and gunners for an army in the field. It is placed in a situation whence rapid access can be had to the line of the army in any part; and at the same time where the divisions of the force can easily mass for its protection. The horses of the park are picketed in lines in its rear.

PARKA, the name given by Fleming to a fossil from the Old Red Sandstone, about which there has been considerable difference of opinion. The quarrymen call them 'berries,' from their resemblance to a compressed raspberry. They were compared by Fleming to the panicles of a Juniper, or the globose head of a Sparganium. Lyell thinks they resemble the egg-cases of a Natica, while Mantell suggested that they were the eggs of a batrachian. The opinion now most generally entertained is that they are the eggs of the *Pterygodus*.

PARKER, a family of distinction in the annals of the British navy. The founder of the family was **SIR HUGH PARKER**, an alderman of London, who received a baronetcy in 1681.—His grand-nephew, **SIR HYDE PARKER**, commanded the British fleet in the action off the Dogger Bank, 5th August 1751,

Fuller (who must have his pun, however bad) says of him: 'He was a Parker indeed, careful to keep the fences.' Yet it must not be forgotten that it is to P. we owe the *Bishops' Bible*, undertaken at his request, carried on under his inspection, and published at his expense in 1568. He had also the principal share in drawing up the *Book of Common Prayer*, for which his skill in ancient liturgies peculiarly fitted him, and which strikingly bears the impress of his broad, moderate, and unsectarian intellect. It was under his presidency, too, that the *Thirty-nine Articles* were finally reviewed and subscribed by the clergy (1562). P. died May 17, 1575.

Among other literary performances, P. published an old Saxon Homily on the Sacrament, by Ælfric of St Albans, to prove that Transubstantiation was not the doctrine of the ancient English church; edited the histories of Matthew of Westminster and Matthew Paris (q. v.); and superintended the publication of a most valuable work, *De Antiquitate Britannicæ Ecclesiæ*, probably printed at Lambeth in 1572, where the archbishop, we are told, had an establishment of printers, engravers, and illuminators. He also founded the 'Society of Antiquaries,' and was its first president; endowed the university of Cambridge, and particularly his own college, with many fellowships and scholarships, and with a magnificent collection of MSS. relating to the civil and ecclesiastical condition of England, and belonging to nine different centuries (from the 8th to the 16th). Of this collection, Fuller said that it was 'the sun of English antiquity before it was eclipsed by that of Sir Robert Cotton.'

PARKER, THEODORE, an American clergyman and scholar, was born at Lexington, Massachusetts, August 24, 1810. His grandfather was captain of a militia company at the battle of Lexington, his father a farmer and mechanic, and his own boyhood was spent at the district school, on the farm, and in the workshop. At the age of 17, he taught a school, and earned money to enter Harvard College in 1830. During his collegiate course, he supported himself by teaching private classes and schools, and studied metaphysics, theology, Anglo-Saxon, Syriac, Arabic, Danish, Swedish, German, French, Spanish, and modern Greek. Entering the divinity class, at the end of his collegiate course, he commenced to preach in 1836, was an editor of the *Scriptural Interpreter*, and settled as Unitarian minister at West Roxbury in 1837. The naturalistic or rationalistic views which separated him from the more conservative portion of the Unitarians, first attracted wide notice, in consequence of an ordination sermon, in 1841, on *The Transient and Permanent in Christianity*. The contest which arose on the anti-supernaturalism of this discourse, led him to further develop his theological views in five lectures, delivered in Boston, and published (1841) under the title of *A Discourse of Matters Pertaining to Religion*, which was followed by *Sermons for the Times*. Failing health induced him to make an extended tour in Europe. In 1845, he returned to Boston, preached to large audiences at the Melodeon, and wrote for the *Dial*, *Christian Register*, *Christian Examiner*, and *Massachusetts Quarterly*. He became also a popular lecturer, and was active and earnest in opposition to slavery, the Mexican war, and the Fugitive Slave Law, for resisting which, by more than words, he was indicted. In the midst of his work, he was attacked, in 1859, with bleeding from the lungs, and made a voyage to Mexico, where he wrote his *Experience as a Minister*, whence he sailed to Italy, where he died at Florence, May 10, 1860. His works, consisting chiefly of miscellanies,

lectures and sermons, have been collected and published in America and England, in which his peculiar views in theology and politics are sustained with great force of logic and felicity of illustration. His learning was as remarkable as his energy and philanthropy. His library of 13,000 volumes he bequeathed to the Boston Free Library. Few men of his time exerted a more powerful influence.

PARKHURST, JOHN, an English biblical scholar, the second son of John Parkhurst, Esq. of Catesby, in Northamptonshire, was born in June 1728, educated at Rugby and at Clare Hall, Cambridge, where he took his degree of M.A. in 1752, and in 1753 published *A Serious and Friendly Address to the Rev. John Wesley, in Relation to a Principal Doctrine advanced and maintained by him and his Assistants*. The doctrine assailed in P.'s pamphlet was the favourite Wesleyan doctrine of 'Assurance.' In 1762 appeared his principal work—indeed the only thing that has preserved his name—*A Hebrew and English Lexicon, without Points, adapted to the Use of Learners*. P. kept mending this Hebrew lexicon all his life. It was a very creditable performance for its time, and long continued to be the standard work on the subject among biblical students in this country; but it is disfigured by its fanciful etymologies, partly the result of his having (like many other divines of his time) adopted the irrational and presumptuous theories of Hutchinson (q. v.), and is now entirely superseded by the works of Gesenius, Ewald, and other critical scholars. P. also wrote a treatise (1787) against Dr Priestley, to prove the divinity and pre-existence of Jesus Christ. He died at Epsom, in Surrey, March 21, 1797.

PARKINSONIA, a genus of plants of the natural order *Leguminosæ*, suborder *Cæsalpiniceæ*.—*P. aculeata* is a West Indian shrub or small tree, which, when in flower, is one of the most splendid objects in the vegetable kingdom. It has pinnated leaves, with winged leaf-stalk, and large yellow flowers spotted with red. It is furnished with strong spines, and is often used for hedges, whence it is called the Barbadoes Flower Fence. It is now common in India. The bark yields a beautiful white fibre, which, however, is not very strong; but it has been suggested that it might be found suitable for paper-making.

PARLEY, in Military Language, is an oral conference with the enemy. It takes place under a flag of truce, and usually at some spot—for the time neutral—between the lines of the two armies.

PARLIAMENT (Fr. *parlement*, from *parler*, to talk), the supreme legislature of the United Kingdom of Great Britain and Ireland. The word was first applied, according to Blackstone, to general assemblies of the states under Louis VII. in France about the middle of the 12th c.; but in that country it came eventually to be the designation of a body which performed certain administrative functions, but whose principal duties were those of a court of justice.

The origin of the Parliament of England has been traced to the Saxon great councils of the nation, called 'Wittena-gemote,' or meeting of wise men. These had, however, little in common with the parliaments of a later date: among other points of difference, they had a right to assemble when they pleased without royal warrant. Even under the Norman kings, the Great Council formed a judicial and ministerial as well as a legislative body, and it was only gradually that the judicial functions were transferred to courts of justice, and the ministerial to the privy council—a remnant of the judicial powers of parliament being still preserved

in the appellate jurisdiction of the House of Lords. Under the Norman kings, the council of the sovereign consisted of the tenants-in-chief of the crown, who held their lands *per baroniam*, lay and ecclesiastic. It was the principle of the feudal system that every tenant should attend the court of his immediate superior; and he who held *per baroniam*, having no superior but the crown, was bound to attend his sovereign in the Great Council or Parliament. In the charter of King John, we for the first time trace the germ of a distinction between the peerage and the lesser nobility, the archbishops, bishops, abbots, earls, and greater barons being required to attend by a writ addressed to each, and the other tenants-in-chief by a general summons by the sheriffs and bailiffs. Baronial tenure originally made a man a baron or lord of parliament. When the offices or titles of Earl, Marquis, or Duke were bestowed on a baron, they were conferred by royal writ or patent, and at length barony came also to be conferred by writ instead of by tenure. During the 13th c., the smaller barons were allowed, instead of personally attending the national council, to appear by representatives; but the principle of representation seems first to have been reduced to a system when permission was also given to the municipalities, which, as corporations, were chief tenants of the crown, to appear by representatives. It is not quite clear when the division of parliament into two Houses took place; but when the representatives of the minor barons were joined by those of the municipalities, the term Commons was applied to both. The Lower House was early allowed to deal exclusively with questions of supply; and seems, in the reign of Richard II., to have established the right to assign the supplies to their proper uses. As the Commons became more powerful they came to insist on the crown redressing their grievances before they would vote the supplies. The influence of parliament was on the increase during the Tudor period, while the reign of the Stewarts was characterised by a struggle for supremacy between the parliament and the crown, each striving to acquire the control of the military force of the country. The powers of the different estates came to be more sharply defined at the Revolution of 1688. Nineteen years later, on the Union with Scotland, the Parliament of England was merged into that of Great Britain.

In its early history, prior to the War of Independence, the Parliament of Scotland had probably not been very unlike that of England; it assembled without warrant, and consisted of bishops, earls, priors, abbots, and barons. At the close of the 13th c., the constitutional history of Scotland diverges from that of England. The addition of the burghs to the national council seems to date from the beginning of the 14th c., but it was not till much later that the lesser barons began to be exempted from attendance. The first act excusing them belongs to the reign of James I., and allows them to choose representatives called Speakers, two for each county, excepting some small counties, which were to have but one, the expenses of the representatives being defrayed by the constituency. The Scottish Parliament was never, like the English, divided into two Houses; all sat in one hall, and though it consisted of three estates, a general numerical majority of members was considered sufficient to carry a measure. The greater part of the business was transacted by the Lords of the Articles, a committee named by the parliament at the beginning of each session, to consider what measures should be passed; and whatever they recommended was generally passed without discussion. It was never held indisputable that the parliament should be summoned

by the crown, and it has even been thought that the royal assent to the measures carried was not absolutely essential. The parliament which carried the Reformation had no royal sanction. The Union was adjusted by commissioners for each country selected by the crown, and passed first, after strong and protracted opposition, in Scotland, and afterwards more easily in England.

By the act of union with Ireland in 1800 (Act 39 and 40 Geo. III. c. 67), the Irish Parliament was united with that of Great Britain as the Parliament of the United Kingdom of Great Britain and Ireland. The Parliament of Ireland had been originally formed on the model of that of England about the close of the 13th c., but it was merely the very small portion of Ireland occupied by the English settlers that was represented, which, as late as the time of Henry VII., hardly extended beyond the counties of Dublin, Lonth, Kildare, and Meath, and constituted what was called the Pale. It was only for the last few years of its existence that the Irish Parliament was a supreme legislature; the English Parliament having, down to 1783, had power to legislate for Ireland. By one of the provisions of Poyning's Act, passed in 1495, no legislative proposals could be made to the Irish Parliament until they had received the sanction of the king and council in England. Act 23 Geo. III. c. 28 gave the Irish Parliament exclusive authority to legislate for Ireland, and the abuse of this power so obstructed the machinery of government, as to render the Union of 1800 matter of necessity.

The power of parliament is, according to Sir Edward Coke, so transcendent and absolute, that it cannot be confined either for persons or causes within any bounds. All remedies which transcend the ordinary courts of law are within its reach. It can alter the succession to the throne, the constitution of the kingdom, and the constitution of parliament itself. It has its own law, to be learned from the rolls and records of parliament, and by precedents and experience. One of the most thoroughly established maxims of this law is, that whatever question arises concerning either House of Parliament ought to be discussed and adjudged there, and not elsewhere. The House of Lords will not allow the Commons to interfere in a question regarding an election of a Scotch or Irish peer; the Commons will not allow the Lords to judge of the validity of the election of a member of their House, nor will either House permit courts of law to examine such cases. The authority of parliament extends to British colonies and foreign possessions. In the ordinary course of government, however, parliament does not make laws for the colonies. For some the Queen in Council legislates; others have legislatures of their own, which propound laws for their internal government, subject to the approbation of the Queen in Council; but these may be repealed and amended by parliament.

The constituent parts of parliament are the sovereign, the House of Lords, and the House of Commons. In the sovereign is vested the whole executive power; the crown is also the fountain of justice, from whence the whole judicial authority flows. To the crown is entrusted the permanent duty of government, to be fulfilled in accordance with the law of the realm, and by the advice of ministers responsible to parliament. The sovereign is also invested with the character of the representation of the majesty of the state. The sovereign's share in the legislature includes the summoning, proroguing, and dissolving of parliament. Parliament can only assemble by act of the sovereign; in but two instances have the Lords and Commons met of their own authority—viz., previously to the

Restoration of Charles II., and at the Convention Parliament summoned at the Revolution of 1688; and in both instances it was considered necessary afterwards to pass an act declaring the parliament to be a legal one. Though the queen may determine the period for assembling parliament, her prerogative is restrained within certain limits. She is bound by statute (16 Chas. II. c. 1; and 6 and 7 Will. and Mary c. 2) to issue writs within three years after the determination of a parliament; and the practice of voting money for the public service by annual enactments, renders it compulsory for the sovereign to meet parliament every year. Act 43 Geo. III. c. 90 provides that the sovereign shall assemble parliament within fourteen days, whenever the militia shall be drawn out and embodied in case of apprehended invasion and rebellion; and a similar proviso is inserted in Act 15 and 16 Vict. c. 50, in case the present militia force should be raised to 120,000 men, and embodied. The royal assent is necessary before any measure can pass into law. The crown, as the executive power, is charged with the management of the revenues of the state, and with all payments for the public service; it is therefore the crown that makes known to the Commons the pecuniary necessities of the government, without which no supplies can be granted. The sovereign's prerogative also includes the sending and receiving of ambassadors, entering into treaty with foreign powers, and declaring war or peace. All the kings and queens since the Revolution have taken an oath at their coronation 'to govern according to the statutes in parliament agreed on, and the laws and customs of the same.' The sovereign is further bound to an adherence to the Protestant faith, and the maintenance of the Protestant religion as established by law. By the Bill of Rights (1 Will. and Mary c. 2, s. 6), and the Act of Settlement (12 and 13 Will. III. c. 2, s. 2) a person professing the popish religion, or marrying a papist, is incapable of inheriting the crown, and the people are absolved from their allegiance. This exclusion is further confirmed by the Act of Union with Scotland; and in addition to the coronation oath, every king or queen is required to take the declaration against the doctrines of the Roman Catholic Church prescribed by 30 Chas. II. c. 2, either on the throne in the House of Lords in the presence of both Houses, at the first meeting of the first parliament after the accession, or at the coronation, whichever event shall first happen. The sovereign is bound by similar sanctions to maintain the Protestant religion and Presbyterian church government in Scotland.

The province of the Houses of Parliament is to legislate with the crown, to provide supplies, to exercise a supervision over the ministers of the crown and all other functionaries, and to advise the sovereign on matters of public moment. The Upper House, from its hereditary and aristocratic character, is a check on the popular branch of the legislature and on hasty legislation.

The House of Lords may originate legislative measures of all kinds, except money-bills. Acts of grace and all bills affecting the rights of the peers necessarily originate in this House. In its judicial capacity, it forms a court for the trial of causes on appeal from the Court of Chancery, on writs of error to review judgments in the Queen's Bench, and on appeal from the Court of Session. It has a judicature in claims of peerage and offices of honour under reference from the crown. Since the union with Scotland and Ireland, it has had the power of deciding controverted elections of representative peers. It tries such offenders as are impeached by the House of Commons, and members of its own

body on indictment found by a grand jury. The House of Lords is composed of lords spiritual and temporal. According to a declaration of the House in 1672, the lords spiritual are only lords of parliament and not peers, a distinction which seems not to have been known in ancient times. They consist of 2 archbishops and 24 bishops for England, who are said to have seats in virtue of their temporal baronies; and 4 Irish bishops, who represent the clergy of Ireland, according to a rotation established at the Union of 1800. The Bishop of Sodor and Man has no seat in parliament, and on Manchester being made a see in 1847, it was arranged that one other bishop should be in the same position, according to a rotation not including the bishops of London, Durham, and Winchester, so as not to increase the number of the lords spiritual. The lords temporal consist of—1. The peers of England, of Great Britain, and of the United Kingdom, of whom there are at present 23 dukes (3 of whom are royal dukes), 19 marquises, 110 earls, 22 viscounts, and 209 barons. The number of the peers of the United Kingdom may be increased without limit by new creations at the pleasure of the sovereign. 2. Sixteen representatives chosen from their own body by the peers of Scotland for each parliament. As no provision was made at the Union for any subsequent creation of Scottish peers, the peerage of Scotland consists exclusively of the descendants of peers existing before the Union. By order of the House of Lords, an authentic list of the Scottish peers was entered on the roll of peers on 12th February 1708, to which all claims since established have been added; and in order to prevent the assumption of dormant and extinct peerages by persons not having right to them, statute 10 and 11 Vict. c. 52, provides that no title standing in the roll, in right of which no vote has been given since 1800, shall be called over at an election without an order of the House of Lords. A representative peer ceases to be one of the representatives on being created a peer of the United Kingdom. 3. Twenty-eight representatives of the Irish peerage, elected for life. For an account of the different degrees of the peerage, and of those privileges of the peers that are unconnected with their position as members of parliament, see NOBILITY. All peerages are now hereditary. Life peerages were in early times not unknown to the constitution; but in 1856, her Majesty having created Sir James Parke, Baron Wensleydale for and during the term of his natural life, the House of Lords, on the report of a Committee of Privileges, decided that the grantee could not sit or vote in parliament. Lord Wensleydale therefore did not offer to take the oaths, and was soon afterwards created a hereditary baron. The lords are entitled to have the attendance in their House of the judges of the Courts of Queen's Bench and Common Pleas, and such of the Barons of Exchequer as are of the degree of the coif, or have been made serjeants-at-law; as also of the Queen's Counsel being serjeants. The votes of spiritual and temporal lords are intermixed, and the joint majority determine every question; but they sit apart on separate benches—the place assigned to the lords spiritual being the upper part of the House on the right hand of the throne. A lord may, by license from the sovereign, appoint another lord as his proxy to vote for him in his absence; but a lord spiritual can only be proxy for a lord spiritual, and a lord temporal for a lord temporal, and no member of the House can hold more than two proxies at the same time. Proxies cannot vote in judicial questions. Peerages are lost by attainder for high treason. Neither the issue of the body of the person attainted, nor, on their failure,

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the descendants of the person first called to the dignity, will be admitted to it without a removal of the attainder. But where the attainted person is tenant in tail-male with a remainder in tail-male to another, the dignity becomes vested in the remainderman on failure of the issue of the person attainted. A peerage, whether by patent or writ, is forfeited by attainder for high treason; attainder for felony forfeits a peerage by writ, not one by patent. An attainted peerage cannot be restored by the crown, only by an act of parliament.

The House of Commons, besides its general power to introduce legislative measures, has the sole right to originate bills levying taxes, or affecting the public income and expenditure, and to examine into the validity of elections to its own body. The question whether it has any control over the rights of electors was the subject of a memorable contest between the Lords and Commons in 1704, in the cases of *Ashby and White*, and of the '*Aylesbury case*' (*Hutell's Precedents*, vol. iii.), a contest ended by the queen proroguing parliament. When inquiring into the conflicting claims of candidates for seats in parliament, the Commons have an undoubted power to determine whether electors have the right to vote. The House of Commons has the right to expel or commit to prison its own members, and to commit other persons who offend by breach of its privileges, contempt of its authority, disobedience of its orders, or invasion of its rights; but this power is limited to the duration of the session. Expulsion does not, however, create any disability to serve again in parliament: a resolution passed in 1769, to exclude Mr Wilkes, duly elected for Middlesex, on the ground of his having been previously expelled for a seditious libel, was proved to be illegal and expunged from the Journals of the House in 1782. The House of Commons has also the power of impeaching offenders, who, however, are tried at the bar of the House of Lords.

The number of members of the House of Commons has varied greatly at different times. In the reign of Edward I., it seems to have been 275; in that of Edward III., 250; and of Henry VI., 300. In the reign of Henry VIII., 27 members were added for Wales, and 4 for the county and city of Chester; 4 were added for the county and city of Durham in the reign of Charles II. Between the reign of Henry VIII. and that of Charles II., 180 new members were added by the granting of royal charters to boroughs which had not previously returned representatives. Forty-five members were assigned as her proportion to Scotland at the Union, and 100 to Ireland, making the whole number of members of the Parliament of the United Kingdom 613—a number which was retained unaltered amid the changes effected by the reform of 1832. Two towns in England, Sudbury and St Albans, have since been disfranchised for bribery, and the 4 vacant seats bestowed, two on Yorkshire, one on Lancashire, and the third on the new borough of Brakenhead. The Reform Acts, 2 Will. IV. c. 45 for England, 2 and 3 Will. IV. c. 65 (amended by 4 and 5 Will. IV. c. 88, and 5 and 6 Will. IV. c. 78) for Scotland, and 2 and 3 Will. IV. c. 88 for Ireland, remodelled the whole electoral system of the United Kingdom. Fifty-six boroughs in England and Wales were entirely disfranchised; 30 which had previously returned two members were restricted to one; while 42 new boroughs were created, of which 22 were each to return two members, and 20 a single member. Several small burghs in Wales were united to elect one member. Four members were assigned to the city of London, 2 to each of the universities of Oxford and Cambridge, and one to 133 cities

and boroughs. Of counties, one, Lancaster, has 5 members; 25 counties and the West Riding of York, 4; 7 counties have 3 members each; 9 counties, and the East Riding and North Riding of York, 2 members; and 10 counties have 1 member each. The Scotch Reform Act increased the number of members for Scotland from 45 to 53, 30 being county and 23 burgh members, some of the latter representing several combined burghs. By the Irish Reform Act the number of members for Ireland was increased from 100 to 105, 64 representing counties, 34 cities and boroughs, and 2 the University of Dublin. At present, the number of members of the House is 658, who are thus distributed:

	Counties.	Boroughs.	Universities.	Total.
England and Wales,	162	334	4	500
Scotland,	30	23		53
Ireland,	64	39	2	105
	256	396	6	658

In England, the former county franchise had been founded exclusively on the holding of freehold property for life of the clear yearly value of 40s., without respect to occupancy; and persons so qualified at the passing of the Reform Act retain their franchise so long as they continue seized of the same freehold. The necessary qualification is now either—1. A freehold of inheritance of the clear yearly value of 40s. 2. A freehold for life of the same value, if in the *bond fide* occupancy of the party claiming to vote, or acquired by marriage, marriage-settlement, devise, or promotion to any benefice or office. If the freeholder for life is not in actual occupancy, or shall have acquired his estate otherwise than in the mode above mentioned, his freehold must be of the clear yearly value of £10. 3. Property not freehold, of inheritance or for life, of the clear annual value of £10. 4. Leasehold of the clear yearly value of £10, if the term was originally not less than 60 years; and of the clear yearly value of £50, if the term was originally not less than 20 years. 5. Occupancy of lands or tenements for which the tenant pays a yearly rent of £50. In boroughs, the old qualification varied much according to local usage. Non-residence was generally no disqualification. Freemen and burgesses, and liverymen in London possessed the franchise. Freeholders to the extent of 40s. had votes in such towns as formed counties in themselves; elsewhere, leaseholders, copyholders, and burgage tenants were admitted. By the remodelled system, the franchise is based chiefly on inhabitancy of premises of the yearly value of £10, former franchises possessed by freeholders and burgage tenants being to a certain extent retained, with a qualification of six months' previous residence. If a person have property which would qualify him as a borough elector, he cannot, instead of becoming a borough elector, choose in respect of that property to qualify as a county elector. In Scotland, the old county qualification consisted in being infeft in lands or superiorities holding directly of the crown of 40s. old extent (see VALUATION), or £400 Scots valued rent; and persons in possession of this franchise before 1831 continued to retain it. The reformed county constituency consists of proprietors of lands and other heritable subjects of the yearly value of £10, tenants whether in occupancy or not, under a long lease where the tenant's interest is £10 yearly, or under a 19 years' lease, where his interest is £50 (sub-tenants must be in occupancy); and tenants in occupancy, paying a yearly rent of £50, or who have paid a grassum of £300. The Scottish burghal franchise was, by the old system, vested in the

members of the town-council and their delegates. A £10 qualification, either as occupant or as proprietor, was substituted by the Reform Act, residence within seven miles of the borough being made necessary in the case of proprietors. By the Irish Reform Act, various classes of freeholders were invested with the county franchise, to whom were added, by 13 and 14 Vict. c. 69, occupiers of land rated for the poor-rate at a net annual value of £12, and persons entitled to estates in fee, or in tail, or for life, of the rated value of £5. The Irish borough qualification introduced by the Reform Act was nearly the same as the English, but the above-mentioned statute of Victoria has added to the constituency the occupiers of lands and premises rated at £8. Certain disqualifications exist from exercising the franchise on the grounds of infamy, alienage, conviction of felony, and the holding of government offices. Peers cannot vote. In the universities of Cambridge and Oxford, the constituency consists of the doctors and masters of arts; and in Dublin, of the fellows, scholars, and graduates of Trinity College.

The several Reform Acts introduced a system of registration of voters for the three divisions of the United Kingdom. In England, lists of voters are prepared by the overseers of each parish, and on certain days courts are held by barristers appointed by the chief justice and the senior judge of each summer circuit to revise these lists, when claims may be made for persons omitted, and objections offered to names standing on the list. If an objection be sustained, the name is struck off the list, there being an appeal from the decision of the revising barrister to the Court of Common Pleas. In Scotland, a register of persons entitled to vote is made up annually in counties and boroughs in terms of the Registration of Voters (Scotland) Act, 24 and 25 Vict. c. 23, which register is printed, and may be had for a small price from the officers charged with making up the roll. By this arrangement, persons eligible as voters are put on the roll without trouble to themselves, and, in point of fact, without their consent. Enrolment, however, may be challenged, in which case objections are heard and determined by the sheriffs. The registration system of Ireland introduced by the Reform Act resembles that of England; and by 16 and 17 Vict. c. 58, provision is made for the annual revision of the list of voters for the city of Dublin.

A property qualification, of £600 a year in candidates for counties, and £300 in candidates for boroughs, which had previously existed in England and Ireland, was left untouched in 1831, but has been abolished by 21 and 22 Vict. c. 26. Scotch peers, though not representative peers, are disqualified from sitting in the House of Commons. Irish peers may represent any constituency in Great Britain, but not in Ireland. A disqualification is also attached to judges (except the Master of the Rolls), clergymen of the Established Church of any of the three kingdoms, Roman Catholic priests, revenue officers, persons convicted of treason and felony, and aliens even when naturalised, unless the right have been conceded in express terms. Sheriffs cannot sit for their own counties, and government contractors are disqualified by 22 Geo. III. c. 45, and 41 Geo. III. c. 52, a disqualification which does not extend to contractors for government loans. A member becoming bankrupt is incapacitated from sitting or voting.

When a new parliament has to be assembled, the Lord Chancellor, by order of the sovereign, directs the Clerk of the Crown to prepare and issue, under the Great Seal, writs to the sheriffs of counties, both for the counties and the boroughs. A sheriff, on

receiving the writ for a county, appoints a day for the election, and on the day fixed proclaims the writ. If no more candidates are then proposed than are to be elected, he declares them duly elected; if there is opposition, a show of hands is asked, and the sheriff declares who has the majority. If a poll is demanded by the opposite party, the election is adjourned. Each county is divided into districts, with a polling-place in each, at which the electors vote; and at the termination of the poll, the return is transmitted to the sheriff, who proclaims the successful candidate. In borough elections in England and Ireland, the sheriff, on receiving the writ, issues his precept to the returning officer of the municipality, who superintends the election; in Scotland, the sheriff himself superintends the borough as well as the county elections. The names of the persons elected both in counties and boroughs are returned by the sheriff to the Clerk of the Crown. Vacancies occurring after a general election are supplied by new writs issued by authority of the House. When it is determined that a writ should be amended, the Clerk of the Crown is ordered to attend the House, and amend it accordingly.

A member of the House of Commons cannot, in theory, resign his seat; but on the acceptance of any office of profit under the crown, his election is, by an act of Queen Anne, declared void, and a new writ issues, he being, however, eligible for re-election. See *CHILTERN HUNDREDS*. The resignation of office is held not to be complete until the appointment of a successor; and on the resumption of office, the seat is held not to have been vacated. A first commission in the army or navy vacates a seat; subsequent commissions do not do so.

Privilege.—Both Houses of Parliament possess extensive privileges for the maintenance of their authority and the protection of individual members. Some of these privileges have well-defined limits; others are so vague in their extent as occasionally to lead to conflicts between parliament and the courts of law. The privilege of speech is claimed of the sovereign by the Speaker of the House of Commons at the opening of every new parliament. At the same time, any member using offensive expressions may be called to the bar to receive a reprimand from the Speaker; or, if the offence be grave, may be committed for contempt, in which case he is sent either to the Tower or to Newgate. Persons not members of the House may also be committed for breach of privilege, and no one committed for contempt can be admitted to bail, nor can the cause of commitment be inquired into by the courts of law. The publication of the debates of either House has repeatedly been declared a breach of privilege; but for a long time back this privilege has been practically waived, except where the reports are false and perverted. Publication of the evidence before a select committee previously to its being reported is punished as a breach of privilege. Libellous reflections on the character and proceedings of parliament or of members of the House come under the same category, as also does assaulting or threatening a member. Wilful disobedience to the orders of the House is punishable as a breach of privilege; but if orders be given beyond the jurisdiction of the House, their enforcement may be questioned in a court of law. The offer of a bribe to, or its acceptance by a member is a breach of privilege; so also is any interference with the officers of the House in the execution of their duty, or tampering with witnesses who are to be examined before the House or a committee of the House. Members of both Houses are free from arrest or imprisonment in civil matters, a privilege

which is permanent in the case of peers extending also to peeresses, whether by creation or marriage (though the latter lose it by subsequently marrying a commoner), and to peers and peeresses of Scotland and Ireland, whether representative or not. It continues in the case of members of the House of Commons during the sitting of parliament, for 40 days after each prorogation, for 40 days prior to the day to which parliament is prorogued, and for a reasonable time after a dissolution. Witnesses summoned to attend before parliament or parliamentary committees, and other persons in attendance on the business of parliament, are also protected from arrest. Protection is not claimable from arrest for any indictable offence. Counsel are protected for any statements that they may make professionally.

Meeting of a New Parliament.—On the day appointed for the meeting of a new parliament, the members of the two Houses assemble in their respective chambers. In the Lords, the Lord Chancellor acquaints the House that 'her Majesty, not thinking it fit to be personally present here this day, had been pleased to cause a Commission to be issued under the Great Seal, in order to the opening and holding of the parliament.' The Lords Commissioners, being in their robes, and seated between the throne and woolpack, then command the Gentleman Usher of the Black Rod to let the Commons know that the 'Lords Commissioners desire their immediate attendance in this House to hear the Commission read.' Meantime, in the Lower House, the Clerk of the Crown in Chancery has delivered to the Clerk of the House a list of the members returned to serve; and on receiving the message from Black Rod, the Commons go up to the House of Lords. The commission having been read in presence of the members of both Houses, the Lord Chancellor opens the parliament by stating 'that by her Majesty's will, as soon as the members of both Houses shall be sworn, declare the causes of her calling this parliament; and it being necessary that a Speaker of the House of Commons should first be chosen, that you, gentlemen of the House of Commons, repair to the place where you are to sit, and there proceed to the appointment of some proper person as your Speaker, and that you present such person whom you shall so choose here to-morrow at 10 o'clock, for her Majesty's royal approbation.' The Commons immediately withdraw, and returning to their own House, proceed to elect a Speaker.

Till a Speaker be elected, the clerk acts as Speaker, standing and pointing to members as they rise to speak, and then sitting down. If only one candidate be proposed for the office, the motion, after being seconded, is supported by an influential member, generally the leader of the House of Commons; and the member proposed, having expressed his sense of the honour meant to be conferred on him, is called by the House to the chair, to which he is led by his proposer and seconder. If another member be proposed and seconded, a debate ensues; and at its close, the clerk puts the question, that the member first proposed 'do take the chair of the House as Speaker.' If the House divide, he directs one party to go into the right lobby, and the other into the left, and appoints two tellers for each. If the majority be in favour of the member first proposed, he is led to the chair; if not, a similar question being put regarding the other member and answered in the affirmative, he is conducted to the chair. The Speaker-elect expresses his thanks for the honour conferred on him, and takes his seat; on which, the mace is laid on the table, where it is always placed during the sitting of the House with

the Speaker in the chair. He is then congratulated by some leading member, and the House adjourns. The next day, the Speaker-elect, on the arrival of Black Rod, proceeds with the Commons to the House of Lords, where his election is approved by the Lord Chancellor. He then lays claim, on behalf of the Commons, to their ancient rights and privileges, which, being confirmed, he retires with the Commons from the bar. Nearly the same forms are observed on the election of a new Speaker, when a vacancy occurs by death or resignation in the course of the session.

The members of both Houses then take the oath prescribed by law, a proceeding which occupies several days. See OATH; ABJURATION. In the Upper House, the Lord Chancellor first takes the oath singly at the table. The Clerk of the Crown delivers a certificate of the return of the Scottish representative peers, and Garter King-at-arms the roll of the lords temporal, after which the lords present take and subscribe the oath. Peers who have been newly created by letters-patent present their patents to the Lord Chancellor, are introduced in their robes between two other peers of their own dignity, preceded by Black Rod and Garter, and conducted to their places. The same ceremony is observed in the case of peers who have received a writ of summons—a formality necessary when a member of the Lower House succeeds to a peerage; otherwise, his seat does not become vacant. A bishop is introduced by two other bishops, without the formalities observed with temporal lords. Representative bishops of Ireland take their seats without any particular ceremony. Peers by descent have a right to take their seats without introduction; peers by special limitation in remainder have to be introduced. In the Commons, the Speaker first subscribes the oath, standing on the upper step of the chair, and is followed by the other members. Members on taking the oath are introduced by the Clerk of the House to the Speaker. Members returned on new writs in the course of the session, after taking the oath, are introduced between two members. They must bring a certificate of their return from the Clerk of the Crown. The oaths are required to be taken in a full House, with the Speaker in the chair—in the Commons, between the hours of nine and four. The presence of a Commission constitutes a full House. In the Upper House, the oaths may, by 6 and 7 Vict. c. 6, be taken till 5 o'clock. On the demise of the crown, the oaths must be taken anew in both Houses.

When the greater part of the members of both Houses have been sworn, the causes of calling the parliament are declared by the sovereign either in person or by commission. In the former case, the Queen proceeds in state to the House of Lords, and commands Black Rod to let the Commons know 'that it is her Majesty's pleasure that they attend her immediately in this House.' Black Rod proceeds to the House of Commons, and formally commands their attendance, on which the Speaker and the Commons go up to the bar of the House of Lords, and the queen reads her speech, which is delivered to her by the Lord Chancellor kneeling on one knee. When parliament is opened by commission, the sovereign not being personally present, the Lord Chancellor reads the royal speech to both Houses. Immediately after the royal speech is read, the House is adjourned during pleasure; but both Houses are resumed in the afternoon, for the purpose of voting an address in answer to the speech from the throne. In each House, it is common to begin business by reading some bill *pro forma*, in order to assert the right of deliberating without

reference to the immediate cause of summons. The royal speech is then read, and an address moved in answer to it. Two members in each House are chosen by the ministry to move and second the address. The preparation of the address is referred to a select committee; it is twice read, may be amended, and when finally agreed on, it is ordered to be presented to her Majesty.

Adjournment, Prorogation, and Dissolution.—Adjournment of parliament is but the continuance of the session from one day to another. Either House may adjourn separately on its own authority, with this restriction, introduced by Act 39 and 40 Geo. III. c. 14, that the sovereign, with advice of the privy council, may issue a proclamation appointing parliament to meet within not less than 14 days, notwithstanding an adjournment beyond that period. On reassembling, the House can again take up business which was left unfinished. A prorogation differs from an adjournment in this respect, that it not merely suspends all business, but quashes all proceedings pending at the time, except impeachments by the Commons, and Appeals and Writs of Error in the Lords. William III. prorogued parliament from 21st October to 23d October 1689, in order to renew the Bill of Rights, regarding which a difference had arisen between the two Houses that was fatal to its progress. It being a rule that a bill of the same substance cannot be introduced twice in the same session, a prorogation has sometimes been resorted to, to enable a second bill to be brought in. Parliament can only be prorogued, as already mentioned, by the sovereign; the royal authority is signified either by the Lord Chancellor, or by writ under the great seal, or by a commission from the crown. When parliament stands prorogued to a certain day, the sovereign is empowered by 37 Geo. III. c. 127 to issue a proclamation, giving notice that parliament is to meet on some other day, not less than 14 days distant, to which day parliament then stands prorogued. At the beginning of a new parliament, when it is not intended that it should meet for the despatch of business, it is usually prorogued by a writ of prorogation read by the Lord Chancellor in the House of Lords. A proclamation is issued prior to the prorogation; and when it is intended that parliament shall meet on the day to which it is prorogued for the despatch of business, the proclamation states that parliament will then 'assemble and be holden for the despatch of divers urgent and important affairs.'

Parliament comes to an end by Dissolution, which is its civil death. This dissolution may be by the will of the sovereign, expressed in person or by her representatives. Having been first prorogued, it is dissolved by a royal proclamation under the great seal, and by the same instrument it is declared that the chancellor of Great Britain and chancellor of Ireland have been respectively ordered to issue out writs for calling a new parliament. These writs are immediately issued, and the period to be fixed by the crown for the assembling of the new parliament, formerly 40 days, was by 7 and 8 William IV. reduced to 35 days. At common law, parliament is *ipso facto* dissolved by the demise of the crown; but, by Act 6 Anne, c. 7, it is continued for six months after the demise, unless sooner dissolved by the successor. The same act requires parliament to assemble immediately on the demise of the crown, notwithstanding adjournment or prorogation; and it is provided that in case no parliament is in being at that time, the last preceding parliament shall meet and be a parliament. By Act 37 Geo. III. c. 127, a parliament so revived continues in existence only for six months, if not sooner dissolved. Were the power of

dissolving the parliament not vested in the executive, there would be a danger of its becoming permanent, and encroaching on the royal authority, so as to destroy the balance of the constitution. An example of this danger is shewn in the Long Parliament, to which Charles I. conceded that it should not be dissolved till such time as it dissolved itself. If the Houses of Parliament encroach on the executive, or act factiously or injudiciously, the crown may, by a dissolution, bring their proceedings to an end, and appeal to the people by sending the members of the House of Commons to give an account of their conduct to their constituents.

There was originally no limit to the duration of a parliament except the will of the sovereign. By 8 Will. and Mary, c. 2, the continuance of a parliament was limited to three years, a term afterwards extended by 1 Geo. I. c. 38, to seven years. The same act of William and Mary enacts that parliament shall assemble once in three years at the least; but the practice of granting the Mutiny Act and the Budget for a year only, makes it necessary that it should assemble annually.

Conduct of Business.—Each House is presided over by its Speaker. The Speaker of the House of Commons does not take part in a debate, offer his opinion, or vote on ordinary occasions; but, in case of equality, he has a casting vote: his duty is to decide all questions which relate to order, putting the matter at issue in a substantive form for the decision of the House, if his own decision is not assented to. He explains any doubts that may arise on bills. He determines the precedence of members rising to address the House. He examines witnesses at the bar. At the close of the session, he addresses the sovereign on presenting the money-bills passed during the session for the royal assent. He nominates the tellers on a division, and makes known the votes to the House. He may commit members to custody during the pleasure of the House, a confinement which terminates with the close of the session. When a vacancy occurs by death, he signs the warrant to the Clerk of the Crown to make out the writ for the election of a new member. He audits the accounts of the receiver of fees, and directs the printing of the votes and proceedings of the House. The Lord Chancellor, or Lord Keeper of the Great Seal, is the Speaker of the House of Lords; in his absence, the Chairman of the Committee of Ways and Means takes the chair. The Speaker is not, as in the Lower House, charged with the maintenance of order, or the decision who is to be heard, which rest with the House itself. The Chairman of the Committee of Ways and Means of the House of Commons as Deputy-speaker, performs the Speaker's duties in his absence. The chief officers of the House of Lords are the Clerk of the Parliaments, who takes minutes of the proceedings of the House; the Gentleman Usher of the Black Rod, who, with his deputy, the Yeoman Usher, is sent to desire the attendance of the Commons, executes orders for committal, and assists in various ceremonies; the Clerk-assistant; and the Sergeant-at-arms, who attends the Lord Chancellor with the mace, and executes the orders of the House for the attachment of delinquents. The chief officers of the Commons are the Clerk of the House, the Sergeant-at-arms, the Clerk-assistant, and Second Clerk-assistant.

Each House has its *Standing Orders*, or regulations, adopted at different periods, relating partly to internal order, partly to certain preliminaries required in the introduction of bills and promulgation of statutes. A standing order endures till repealed (or 'vacated,' as it is called in the Upper House); but each House is also in the practice of agreeing to certain orders or *resolutions* of uncertain

duration declaratory of its practice, which are considered less formally binding than standing orders.

The House of Lords usually meets at 5 P.M.; the Commons at a quarter before 4, except on Wednesdays and some other days specially appointed, when the hours of sitting are from 12 to 6. In the Lords, the Chancellor, as Speaker, sits on the woolsack. A standing order, which is never enforced, requires the Lords to take place according to precedence. Practically, the bishops sit together on the right hand of the throne; the members of the administration on the front bench on the right hand of the woolsack adjoining the bishops, and the peers who usually vote with them occupy the other benches on that side. The peers in opposition are ranged on the opposite side, and those considered politically neutral occupy the cross benches between the table and the bar. In the House of Commons, the front bench on the right hand of the chair is reserved for the ministry, and called the Treasury Bench, the front bench on the opposite side being occupied by the leaders of the opposition. By ancient custom and orders of both Houses, rarely enforced, strangers are excluded while the Houses are sitting.

Prayers are read before business is begun—in the House of Lords by a bishop; in the House of Commons by the chaplain. Every member is bound to attend the House—in the Lower House, personally; in the Upper personally, or by proxy; but in ordinary circumstances, this obligation is not enforced. The House of Lords may proceed to business when three peers are present; in the Commons, forty members are required to constitute a House for the despatch of business. The Speaker counts the House at four; and if that number be not then present, or if it be noticed, or appear on a division, that fewer than forty members are present, the House is adjourned. A call of the House is an expedient to secure attendance on important occasions; when it is made, members absent without leave may be ordered to be taken into custody. When matters of great interest are to be debated in the Upper House, the Lords are 'summoned.'

To make a motion, or, more properly, to *move the House*, is to propose a question, and notices of motions should be given on a previous day. The Commons are in the practice of setting apart Mondays, Wednesdays, Thursdays, and Fridays for considering *orders of the day*, or matters which the House had already agreed to consider on a particular day, and to reserve Tuesdays for motions. Government orders take precedence of others on all order days except Wednesdays, which are generally reserved for the orders of independent members. Notices of motions are by a standing order not allowed to be given for any period beyond the four days next following on which motions are entitled to precedence. Questions of privilege may be considered without previous notices, and take precedence both of other motions and orders of the day. A motion may be accompanied by a speech, and must in the Lower House be seconded, otherwise there is no question before the House. In purely formal motions this rule is not observed, and an order of the day may be moved without a seconder. A seconder is not required in the House of Lords. A motion in the Commons must be reduced to writing by the mover, and delivered to the Speaker, who, when it has been seconded, puts it to the House; it cannot then be withdrawn without leave of the House. In the Lords, when a motion has been made, a question is proposed 'that the motion be agreed to.' When an amendment is proposed to a question, the original motion cannot be withdrawn till the amendment has been either withdrawn or negatived.

An amendment is properly such an alteration on a motion by striking out or adding words, or both, as may enable members to vote for it who would not have done so otherwise.

A question may be evaded or superseded in four ways: 1. By adjournment. Any member in possession of the House may move 'that the House do now adjourn.' The House may also be adjourned, even while a member is speaking, on its being noticed that there are fewer than forty members present. The motion, 'that the debate be now adjourned,' does not supersede the question, but merely defers the decision of the House. 2. By a motion, that the orders of the day be now read, which may be put and carried on days on which notices of motion have precedence. 3. By what is called *moving the previous question*. The act of the Speaker in putting the question is intercepted by a motion, 'that the question be now put.' The mover and seconder of this motion vote against it; and if it be resolved in the negative, the Speaker is prevented from putting the main question, which, however, may be brought forward on another day. 4. By an amendment substituting words of an entirely different import for those of the motion, so that the sense of the House is taken on a totally different question.

When the question is put by the Speaker in the Lords, the respective parties exclaim 'content' or 'non-content'; in the Commons, the expression used is 'aye' or 'no.' The Speaker signifies his opinion which party have the majority, and if the House acquiesce, the question is said to be resolved in the affirmative or negative; when his decision is disputed, the numbers must be counted by a division. Both Houses now divide by the content or ayes going into the right lobby, and the non-contents or noes into the left, each being counted by tellers appointed by the Speaker. In the House of Commons, two clerks with printed lists of the members put a mark to the name of each as he re-enters the House, so as to secure accuracy in the division-lists. The Speaker of the Commons, who does not otherwise vote or take part in a debate, has a casting-vote in case of equality. In the House of Lords, the Speaker is, on the other hand, not disqualified from taking part in a debate; he votes on divisions, but has no casting vote; and on an equality, the non-contents prevail. The system of pairing commonly practised, though never directly recognised by the House, enables members on opposite sides to absent themselves for a time agreed on, each neutralising the votes of the other. A member of the Upper House may, with leave of the House, by a protest enter his dissent from a vote of the House, and its grounds. Every protest is entered on the Journals of the House, together with the names of all the lords who concur in it.

No question or bill is allowed to be offered in either House substantially the same with one on which the judgment of that House has already been expressed in the current session. A resolution of the House, however, may be rescinded, and an order discharged; and by 13 and 14 Vict. c. 21, it is provided that every act may be altered, amended, or repealed in the same session of parliament.

In debate, a member of the Commons addresses the Speaker; a member of the Upper House the lords generally, in both cases standing and uncovered. No member may speak except when there is a question before the House, or with the view to propose a motion or amendment, the only admitted exceptions being in putting questions to ministers of the crown, or to members concerned in some business which is before the House, and in explaining personal matters. A member is not

allowed to speak twice to the same question except in explanation, and the proposer, in some cases, in reply—a restriction which does not apply in committee. By the rules adopted by both Houses for preserving order in debate, no allusion is allowed to debates of the same session on a question not under discussion, or to debates in the other House of Parliament. All reflections on any determination of the House are prohibited, except when made with a view of moving that the determination be rescinded; so is the mention by a member of her Majesty's name either irreverently, or to influence the debate, and the use of offensive and insulting words against parliament or either House, or a member of the House in which he is speaking. No member is allowed to refer to another by name, or otherwise than by the rank or office which he enjoys, or place which he represents. The Speaker naming a member to the House, is an old established form of censure, which was last used when Mr Feargus O'Connor struck the member beside him.

Messages.—It is often found necessary for the Houses to communicate with each other regarding matters occurring in the course of business. Messages from the Lords were formerly sent by Masters in Chancery or judges, while the Commons sent a deputation of their own members. According to a new arrangement adopted in 1855, one of the clerks of either House may be the bearer of a message.

Committees.—Parliamentary committees are either 'of the whole House,' or 'select.' A committee of the whole House is the House itself, with a chairman instead of the Speaker presiding. The chair is taken in the Lords by the chairman of committees appointed at the beginning of each session, in the Commons by the chairman of the Committee of Ways and Means. Matters relating to religion, trade, the imposition of taxes, or the granting of public money, are generally considered in committee before legislation, as also are the provisions of any public bill. Proceedings are conducted nearly as when the House is sitting, the Lords being addressed in the Upper House, and in the Lower the chairman, who has the same powers to maintain order as the Speaker, and a casting vote in case of equality. In committees of the Commons, as in the House itself, a quorum of forty members is required; but if that number are not present, the Speaker must resume the chair to adjourn the House. A motion in committee need not be seconded, and there is a more unlimited power of debate than in the House, members being at liberty to speak any number of times on the same question. A motion for 'the previous question' is not allowed. When the business of the committee is not concluded on the day of sitting, the House is resumed, and the chairman moves 'that the House be again put into committee on a future day,' in the Lords, and in the Commons reports progress, and asks leave to sit again.

Select committees are composed of a limited number of members appointed to inquire into any matter, and report. In the Commons, it is usual to give select committees power to send for persons, papers, and records; in the Lords, they may, without any special authority, summon witnesses. In neither House can a committee enforce the attendance of a witness; this must be done, when necessary, by the House itself. The Commons have certain standing orders for insuring the efficiency of committees, and impartiality in their appointment. No committee is to consist of more than fifteen. Members moving for a committee must ascertain whether the members whom they propose to name will attend. Lists of the members serving on each committee are to be affixed in the committee

clerk's office and the lobby. To every question asked of a witness, the name of the member who asks it is to be prefixed in the minutes of evidence laid before the House; and the names of the members present at each sitting, and, in the event of a division, the question proposed, the name of the proposer, and the votes of each member, are to be entered on the minutes, and reported to the House. In the Lords there are no special rules regarding the appointment and constitution of committees; but resolutions containing arrangements similar to those of the Commons regarding questions to witnesses, minutes of proceedings, and divisions, have been adopted since 1852. Select committees have the power of adjournment from time to time, and sometimes from place to place. By an anomaly not easily explained, the Commons have always been considered not to have the power of administering oaths; a power of examining on oath has, however, by statute been granted to election committees, and committees on private bills. In the House of Lords, witnesses had formerly to be sworn at the bar of the House; but the oath may, in terms of a recent act (21 and 22 Vict. c. 78), be administered by any committee of the House. Except where leave of absence has been obtained, no member can excuse himself from serving on committees to which he may have been appointed, or for not attending when his attendance has been made compulsory by order of the House. In committees on private bills in the Commons, the chairman has a deliberative as well as a casting vote.

Bills.—The principal business which occupies both Houses is the passing of bills. In early times, laws were enacted in the form of petitions from the Commons, which were entered on the Rolls of Parliament, with the king's answers subjoined; and at the close of the session, these imperfect records were drawn up in the form of a statute, which was entered on the Statute Rolls. It was found that, on undergoing this process, the acts passed by the parliament were often both added to and mutilated, and much of the legislative power practically came into the hands of the judges. Bills in the form of complete statutes were first introduced in the reign of Henry VI. Bills are either public or private; the former affect the general interests of the community, the latter relate to local matters. Public bills are introduced directly by members; private bills by petitions from the parties interested, presented by members. Bills may originate in either House; but the exclusive right of the Commons to deal with all legislation regarding taxes or supplies, makes it necessary and expedient that by far the greater part of both public and private bills, except such as are of a purely personal nature, should originate in the Lower House. Bills regarding restitution of honours originate in the House of Lords. One description of act alone originates with the crown—an act of grace or pardon. It is read only once in each House, and cannot be amended, but must be accepted in the form in which it is received from the crown, or rejected.

Public Bills.—In the House of Lords, any member may present a bill. In the Commons, any member may move for leave to bring in a bill, except it be for imposing a tax, when an order of the House is required. When the motion is seconded, and leave given, the mover and seconder are ordered to prepare and bring in the bill. Such bills, however, as relate to religion, trade, grants of public money, or taxation, are required to be introduced by the House itself, on the report of a committee of the whole House. A bill is drawn out on paper, with blanks or italics where any part is doubtful, or

disagreement between the Houses, the same forms are observed as in public bills.

In recent times, the necessity for obtaining private acts has been, in many cases, obviated by general laws adapted to different classes of objects, of which parties are enabled to avail themselves, instead of applying to parliament for special powers.

Royal Assent.—A bill becomes a statute or act of parliament on receiving the royal assent, which is given in the House of Lords, the Commons being also present at the bar. It is given in either of two ways: by letters-patent under the Great Seal, signed by the sovereign's own hand, and communicated to the two Houses by commissioners; or by the sovereign present in person in the House of Lords. When the royal assent is given by commission, three or more of the Lords Commissioners command Black Rod to signify to the Commons that their attendance is desired, on which the Commons, with the Speaker, immediately come to the bar. The commission is then read at length; and the titles of all the bills being read by the Clerk of the Crown, the royal assent to each is signified by the Clerk of the Parliaments in Norman-French, and so entered on the Lords' Journals. In assenting to a public bill, the words used are: 'Le roy [la reyne] le veult;' to a private bill: 'Soit fait comme il est désiré;' and to a bill of supply (which is presented by the Speaker, and receives the royal assent before all other bills): 'Le roy remercie ses bons sujets, accepte leur benevolence, et ainsi le veult.' In the case of an act of grace, which has originated with the crown, there was, till lately, no further expression of the royal assent; but the Clerk of the Parliaments, having read its title, said: 'Les prélats, seigneurs, et communes, en ce présent parlement assemblés, au nom de tous vos autres sujets, remercient très-humblement vostre Majesté, et prient à Dieu vous donner en santé bonne vie et longue:' the royal assent, however, has been latterly given to acts of grace in the usual form. The refusal of the royal assent is announced by the words, 'Le roy s'avisera.' But the necessity for such refusal is generally removed by the observance of the constitutional principle, that the queen has no will but that of her ministers, who only continue in office so long as they have the confidence of parliament. The last instance in which the royal assent was refused was by Queen Anne in 1707, regarding a bill for settling the militia in Scotland.

The royal assent is seldom given in person, except at the close of a session, when the queen attends to prorogue parliament, and then signifies her assent to such bills as have been passed since the last commission was issued; but bills providing for the honour and dignity of the crown, and bills for settling the civil lists, have generally been assented to by the sovereign in person, immediately after they have passed both houses. When the royal assent is given in person, the Clerk of the Crown reads the titles of the bills; and the Clerk of the Parliaments, who has previously received her Majesty's commands in the robing room, makes an obeisance to the throne, and signifies her Majesty's assent, as already described, the queen giving a gentle inclination.

Supplies.—Prior to 1688, in addition to parliamentary taxation, imposts were sometimes levied by an exercise of the royal prerogative. Since the Revolution, no taxes have been raised otherwise than by parliamentary authority. The Commons have the exclusive right to impose taxes and vote money for the public service. The Lords cannot even make an alteration in a bill of supply, except to correct a clerical error. The Lords are not even entitled to insert in a bill any pecuniary penalties,

or to alter the amount or application of any penalty imposed by the Commons; a rule whose rigid assertion has been found to be attended with so much inconvenience that there has latterly been a disposition to relax it. If a bill containing provisions which make a pecuniary charge on the public originate in the Lords, any such provisions are struck out in the bill as sent to the Commons. In the Commons, these provisions are printed in red ink, and supposed to be blank, and may be agreed to in committee. But though the Commons has the exclusive right to grant supplies, a grant requires the ultimate assent of the queen and the House of Lords.

The public revenue of the crown is derived in part from permanent charges on the consolidated fund, and in part from actual grants for specific public services, which require the yearly sanction of parliament. On the opening of parliament, the queen demands from the Commons the annual provision for the public services, and directs estimates to be laid before them. On agreeing to the address in answer to the royal speech, the Commons order the speech to be taken into consideration on another day. On the arrival of that day, a motion is made: 'That a supply be granted to her Majesty,' and the House resolves into a committee to consider that motion. On the day appointed, the committee sits and agrees that a supply be granted, which, being reported, is agreed to by the House. The House then appoints another day on which it resolves itself into a 'Committee of Supply.' The estimates for the army, navy, and ordinance departments, are first laid before the committee; then the estimates for civil services, known as the miscellaneous estimates. The first business of the Committee of Supply is to elect a chairman, who is known as the Chairman of the Committee of Ways and Means, over which he also presides. When the first report of the Committee of Supply has been received and agreed to, a day is appointed for the House to resolve itself into a 'Committee of Ways and Means.' This committee is not appointed till a sum has been voted by the House, nor is it afterwards allowed to vote in excess of the expenditure voted by the Committee of Supply. It is the function of the Committee of Supply to consider what specific grants are to be voted, and of the Committee of Ways and Means to determine how the funds shall be raised which are voted by the Committee of Supply. Without special parliamentary authority, the consolidated fund could not be applied to meet the supplies voted for the service of the year; but to make it so available, the Committee of Ways and Means votes general grants from time to time out of the consolidated fund 'towards making good the supply granted to her Majesty;' and bills are founded on the resolutions of the committee, by which the treasury receives authority to issue the requisite amount from the consolidated fund for the service of the year. It belongs to the Committee of Ways and Means to determine what sums shall be raised by exchequer bills in anticipation of the annual revenue, to make up the supply granted to her Majesty. When the Committee of Supply has determined the number of men that shall be maintained during the year for the army and sea-service, and its resolutions have been agreed to, the *Mutiny Bill* and *Marine Mutiny Bill* are brought in, providing respectively for the discipline of the troops and marines when on shore. Apart from this annual sanction, the maintenance of a standing army in time of peace would be illegal, and the army and marines would be relieved from all martial discipline. The Committee of Ways and Means receives the annual financial statement from the

election committees, they select six, eight, ten, or twelve members who are called the chairmen's panel, and are liable throughout the session to serve as chairmen of select committees, but are exempted from serving on select committees in any other capacity. The remaining members on the list are then divided into five panels, which being ranged in order by lot, are to take their turn successively in furnishing members for election committees. Each select committee consists of four members, chosen by the general committee from the panel in service, and a chairman appointed by the chairmen's panel. The members are sworn at the table by the clerk, 'well and truly to try the matter of the petition, and a true judgment to give, according to the evidence.' Evidence may be taken on oath, and it is enacted by the Corrupt Practices Act, 1863, that no witness is excused from answering a question on the ground that his answer may criminate himself; but a witness, making an answer which tends to criminate him, may demand a certificate which shall be a protection to him from prosecution for such answer. The decision lies with the majority of the committee, the chairman having both a deliberative and a casting vote. The committee are required to determine whether the sitting member, or any other person, be duly returned, or whether the election be void, or whether a new writ ought to issue; and their determination is final, and is carried into execution by the House. They may also make a special report on some other point, which is not final. The most frequent subjects of special reports are bribery, treating, and the use of undue influence, matters regarding which various acts have been passed, the most important being 17 and 18 Vict. c. 102 (1854), 21 and 22 Vict. c. 87 (1858), and 26 Vict. c. 29 (1863), three statutes known as the 'Corrupt Practices Prevention Acts.' It was formerly required to prove agency, before evidence was allowed to be given of the facts on which a charge of bribery rested, but Act 4 and 5 Vict. c. 57, dispensed with this necessity. By the Corrupt Practices Prevention Act, 1863, when an election petition complains of bribery, treating, or undue influence, the committee is required to report whether they had been extensively practised. The candidate declared by an election committee guilty of bribery, treating, or undue influence by himself or his agents, is declared by the Corrupt Practices Act, 1854, to be incapable of representing the same constituency in the then existing parliament. The new law of evidence affords further facilities for the detection of bribery, in so far as it allows the personal examination of the sitting members and candidates.

By the Act of 1854, the offering of money, office, employment, &c., to a voter to induce him to vote or abstain from voting, or the offering of a similar consideration to any person to induce him to procure the return of a candidate or the vote of an elector, the acceptance of such consideration, and the payment of money in the knowledge that it is to be expended in bribery, or the repayment of money which has been spent in bribery, are all declared to be acts of bribery punishable by fine and imprisonment, as well as by the forfeiture of £100 with costs to any person who will sue for the same. Any voter who agrees to receive money, office, or employment for voting or abstaining from voting, and any person who, after an election, receives money or other consideration on account of any person having voted or refrained from voting, is also guilty of bribery, and liable to forfeit £10 with costs to any one who will sue for the same. *Treating*, which is defined as the providing of meat, drink, or other entertainment to any person

in order to be elected, or in consideration for any person voting or abstaining from voting, involves a penalty of £50 similarly recoverable, as also does *undue influence*, or interference by intimidation, abduction, or otherwise, with the freedom of electors. Persons guilty of any of these offences are, by the provisions of the same acts, to be struck off the register, and their names inserted in a separate 'list of persons disqualified for bribery, treatment, and undue influence,' which is to be appended to the register of voters. Cockades are prohibited, as is the furnishing of refreshment on the day of election to a voter in consideration of his being about to vote. By the Corrupt Practices Act, 1854, it is however declared lawful to provide a conveyance for a voter, though not to pay him a sum of money for travelling expenses. By the Act of 1863, no payment is allowed to be made on behalf of a candidate except through his authorised agent, and all claims against a candidate in respect of an election must be settled within a month, otherwise the right to recover them is barred. A detailed account of election expenses with vouchers is required to be delivered within two months of the election to the returning officers, by whom it is published in a local newspaper, and the vouchers are to be open for a month to the inspection of voters.

Act 15 and 16 Vict. c. 57 enacts that upon the joint address of both Houses of Parliament representing to her Majesty that a committee of the House of Commons has reported that corrupt practices have prevailed extensively at any election, her Majesty may appoint commissioners to make inquiry. The Corrupt Practices Prevention Act, 1863, provides that when an election committee has reported that certain persons named have been guilty of bribery or treating, and their report is confirmed by a commission of inquiry, such report, with the evidence taken by the commission, is to be laid before the attorney-general with the view of instituting a prosecution.

Impeachment.—In the reign of Henry VIII. an act of attainder was the usual mode of proceeding against state offences. A bill of attainder sometimes followed a regular trial and conviction, as in the case of Empson and Dudley, but was sometimes passed without trial, examination of witnesses, or hearing the accused party, as in the attainder of Fisher and Sir Thomas More. The practice of impeachment of extraordinary offenders before the Lords by the Commons, which had been frequent during the 14th and 15th centuries, was revived in the reign of James I. This proceeding is not like bills of attainder or pains and penalties, the making of a new law *pro re nata*, but a carrying out of the already known and established law. The great representative inquest of the nation first find the crime, and then as prosecutors support the charge before the highest court of criminal jurisdiction. It has always been allowed that a peer may be impeached for any crime whether cognizable by the ordinary courts or not. The right of the Commons to impeach a commoner of a capital offence, which was at one time doubted, has been solemnly affirmed by the House of Lords. The trial is conducted by managers for the Commons. Witnesses are summoned by the Lords at the desire of the Commons, and Westminster Hall has usually been the place of trial, the Lord High Steward presiding. The managers make their charges and adduce evidence; the accused answers, and may defend himself by counsel; and the managers have a right to reply. In giving judgment, the question is put by the Lord High Steward to each peer, beginning with the junior baron, on each article separately, whether the accused be guilty. The

obtaining a reform of certain abuses, and a more liberal political constitution, similar to what Tuscany had (February 1848) obtained from its grand-duke, he threw himself into the arms of Austria, and consented to the occupation of his territory by Austrian troops. In March 1848 a revolution broke out, and the duke was compelled to grant the popular demands, but he almost immediately after retired from the country. P. joined with Sardinia in the war of 1848—1849 against Austria, but on the triumph of the latter power was compelled to receive Charles III. (his father, Charles II., having resigned his throne, March 1849) as its ruler. The new duke recalled the constitution which his father had been compelled to grant, and punished with great severity the active agents of the revolutionary movements in his dominions. His arbitrary measures were effectively seconded by his chief minister, an Englishman named Ward, who shared the public obloquy with his master. After Charles III.'s assassination in March 1854, his widow Louise-Marie-Therese de Bourbon, daughter of the last Duke of Berry (q. v.), assumed the government for the behoof of her son Robert I., and made some attempts at political reform; but owing to the excited state of the people they were little effective, and she and her son were compelled to leave the country in 1859, on the outbreak of a new war between Sardinia and Austria. In March 18th of the following year the country was annexed to Sardinia, and now forms a part of the Kingdom of Italy, constituting the two provinces of Parma (area 1251 English square miles, pop. 253,502) and Piacenza (area 965 English square miles, pop. 210,933), a few of the outlying districts, amounting to about 150 square miles, being incorporated with other provinces.—*Official Statistics of the Kingdom of Italy* (Turin, 1861); *Budget of the Emiliars*; *Report of the Marquis Pepoli to the Minister of Finances* (Turin, 1860); *idem. Report of General Tozze to the Minister of War* (1863).

PARMA, the chief town of the province of the same name in Italy, and formerly the capital of the duchy of Parma, is situated on both sides of the river Parma, 12 miles south from the Po, 75 miles south-east from Milan, and about the same distance east-north-east from Genoa, with a population (1863) of 47,428.

The town is of a circular form, and is surrounded by walls and ditches flanked by bastions; the streets are straight and wide, and meet at right angles, the chief of them, a part of the Roman Via Emilia, crossing the city from east to west, and dividing it into two nearly equal parts. P. is celebrated for its churches, 10 in number, the chief of which are the *Duomo*, or Cathedral (consecrated 1106 A.D.), built chiefly in the Lombard style, having the interior adorned with magnificent frescoes by Correggio, and paintings by other artists, and surmounted by a beautiful dome; the *Battisterio*, or Baptistery, one of the most splendid in Italy, begun in 1196 and completed in 1281; the church of the *Madonna della Steccata*, containing the famous painting of 'Moses breaking the Tables of the Law' by Parmigianino. The other celebrated buildings are, the Farnese Palace, a gloomy and ill-constructed edifice; the Farnese Theatre, built (1618—1628) of wood, and now in a most dilapidated condition. P. has also a library containing 140,000 volumes, mostly well selected, and many of them rare and valuable works; a museum of antiquities; a botanic garden; a theatre (*Teatro Nuovo*); an academy of fine arts, founded in 1752, possessing a collection of 600 pictures, many of which are exceedingly valuable. The pictures

most highly esteemed are the 'Madonnas' of Correggio and Francia, the 'St Jerome' of Correggio, and the 'Jesus Glorified' of Raphael.

The manufactures of P. are stockings, porcelain, sugar, wax-candles, and vessels of crystal, also silk, cotton, and fustian stuffs. The chief exports are cheese and silk goods; and in June there is an annual silk fair.

PARMA, BATTLES OF. An indecisive engagement took place here June 29, 1734, between the confederated armies of England, France, and Spain, and the Austrians; and on June 19, 1799, the French under Macdonald were routed by the Russians under Suwarof, with a loss of 10,000 men and 4 generals.

PARMELIA, a genus of Lichens, with a leafy horizontal thallus which is lobed and cut; and orbicular shields (*apothecia*) fixed by a central point, concave, and bordered by the inflexed thallus. The species are numerous, and many are found in Britain. Some of them are occasionally employed in dyeing. Various chemical principles have been discovered in lichens of this genus, as *Usnic* or *Usnic Acid* (also found in species of the genus *Usnea*), and *Parietin*. Valuable medicinal properties—tonic and febrifugal—have been ascribed to *P. parietina*, the Common Yellow Wall Lichen, or Common Yellow Wall Moss of the herb shops, a bright yellow species with deep orange shields, plentiful on walls and trees in Britain and most parts of Europe.

PARMENIDÉS, a Greek philosopher of Elea, in Lower Italy, and in the opinion of the ancients the greatest member of the Eleatic school, flourished about the middle of the 5th c. B.C. Nothing is known with certainty regarding his life, but he is said to have visited Athens in his old age, and to have conversed with Socrates, then quite a youth. The story, though it rests on the authority of Plato, has a suspicious air, and seems as if it were intended to account for the influence which the philosophy of P. undoubtedly exercised on that of Socrates and Plato themselves. P., like Xenophanes of Colophon, sometimes regarded as the first of the Eleatics, expounded his philosophy in verse—his only work being a didactic poem *On Nature*. The leading design of this poem is to demonstrate the reality of Absolute Being, the non-existence of which P. declares to be inconceivable, but the nature of which, on the other hand, he admits to be equally inconceivable, inasmuch as it is dissociated from every limitation under which man thinks. P. is not a theologian in speculation, seeking rather to identify his 'Absolute Being' with 'Thought' than with a 'Deity.' Only fragments of his poem remain, which have been separately edited by Fülleborn (Züllichau, 1795); another collection is that by Brandis, in his *Commentationes Eleaticæ* (Altona, 1815); but the best is to be found in Karsten's *Philosophorum Græcorum veterum Reliquiæ* (Amstelod., 1835).

PARMIGIANO, GIROLAMO FRANCESCO MARIA MAZZOLA, called Parmigiano or Parmigianino, born at Parma in 1503, an able painter of the Lombard school, and the most distinguished of those who followed the style of Correggio. His pictures attracted much attention when he was little more than fourteen years of age. In 1523 he went to Rome to follow out his studies, and was soon favourably noticed and employed by Clement VII. He was in that city when it was stormed by the imperialists under Bourbon in 1527, and it is said, was calmly at work on his picture of 'The Vision of St Jerome' (now in the National Gallery, London) when soldiers, bent on pillage, burst into

the soil naturally fertile, but imperfectly cultivated. The island is especially productive in cotton, wax, honey, partridges, and wild pigeons. Near the middle of the island, the mountain Capresso (ancient *Marpessa*), abounds in the famous Parian marble, which was used by many of the greatest sculptors of antiquity. Parekhia, on the west coast, the principal town, and Naussa, on the north east, is the chief port.

In ancient times, P., which is said to have been colonised by Cretans, attained great maritime prosperity, and became wealthy and powerful. It submitted to the Persians; and after the battle of Marathon was assailed ineffectually by Miltiades, who received here the wound of which he soon after died. After the defeat of Xerxes, P. came under the supremacy of Athens, and shared the fate of the other Cyclades. Archilochus, the inventor of Iambic verse, was born here.

PAROTID GLAND. See **SALIVARY GLANDS.**

PARQUETRY, a kind of wood mosaic used only for flooring. The art of making inlaid wood floors has until lately much declined in this country, but on the continent it has been much in use, and has been carried to great perfection. Parquetry floors are usually of oak, but other and more ornamental woods have also been much used for giving variety and beauty to the pattern. In the more elaborate kinds of parquetry, veneers are used, but it is much more generally composed of blocks of wood squared at the sides, and laid down so as to combine and form a geometric pattern. Of late, the taste for this work has revived in Britain, and it is beginning to be extensively employed in the better class of buildings.

PARR, SAMUEL, LL.D., a once notable scholar, was born January 15, 1747, at Harrow-on-the-Hill. He entered Emmanuel College, Cambridge, in 1765; but the death of his father, two years afterwards, necessitated his doing something for himself, and he was, in consequence, induced to accept an assistant-mastership at Harrow, where he remained five years. The head-mastership then becoming vacant, P. applied for it, but was rejected, whereupon he left, and started as an independent schoolmaster. In 1777, he was appointed Master of Colchester School, where he was ordained priest, and obtained the curacies of Hythe and Trinity Church. Next year, he became Master of Norwich School; but in 1786, settled at Hatton in Warwickshire, where he spent the rest of his life. In 1787, he published an edition of Bellenden, to which he prefixed his celebrated preface, which is as remarkable for its uncompromising advocacy of Whig principles as for the scrupulous Ciceronianism of its Latinity. He died March 6, 1825.

It is almost impossible to understand the reputation which P. once had. None of his voluminous writings justify it. That he was in some respects an accomplished, and even a great scholar, is undoubted, for he could write Latin of Ciceronian purity and finish; but it is equally undoubted that he never did anything with his boasted scholarship. P. has left the world absolutely nothing to keep it in remembrance of him, yet his complete works (edited by Dr J. Johnstone in 1828)—exclusive of his contributions to periodicals—form eight enormous tomes, and contain 5734 octavo pages, many of them printed in small type. They relate to matters historical, critical, and metaphysical, but in all of them 'the thread of Parr's verbosity is finer than the staple of his argument.' What, then, gave him the fame that he certainly enjoyed during his life? Beyond all question, it was his conversational powers. He was an amazing, an overwhelming

talker. Bold, dogmatic, arrogant, with a memory profoundly and minutely retentive, and with a genuine gift of ephemeral epigram, he seemed, at the tables of statesmen, and wits, and divines, to be a man of tremendous talent, capable of any literary feat; but the learning and the repartee have left little trace of their existence, and posterity declines to admire the wonders that it has neither seen nor heard. See De Quincey's famous essay on 'Dr Samuel Parr on Whiggism in its Relations to Literature' (Author's edition, vol. 5. Edin. Adam and Charles Black, 1862).

PARRA. See **JACANA.**

PARRAKEET, or **PARROQUET**, a name very commonly given to many of the smaller species of the parrot family; generally to species having long tails, and natives of the East Indies, Africa, and Australia, not so frequently to American species; although it is sometimes also applied to some of these, indifferently with the name Parrot.—One of the most beautiful groups of the *Psittacida*, combining gracefulness of form with splendour of plumage, is that to which the *ALEXANDRINA* P. or *RING P.* (*Palaeornis Alexandri*) belongs. It is about the size of a common pigeon, green, with a red collar, whence its name Ring P., and is a native of the



Warbling Grass or Zebra Parrakeet (*Melospittacus undulatus*).

East Indies. It is said to have been brought to Europe by some of the members of Alexander the Great's expedition to India, and to have been the first of the parrot tribe known to the Greeks and Romans, by whom it was highly prized, as it still is, not only for its beauty, but for its docility and its power of imitating human speech. Like many of its tribe, it is gregarious, and immense flocks make their abode in some of the cocoa-nut groves of the western parts of Ceylon, filling the air with the most deafening screams. The Ring P. has many congeners, natives chiefly of the East Indies, exhibiting much variety of splendid plumage.—Somewhat like them in length and form of tail, but with longer and stronger legs, is the **GROUND P.**, or **GROUND PARROT** (*Pezophorus formosus*), of Australia, a bird

PARROT-FISH—PARRY.

Whilst the name *P.* popularly includes all, except that it is seldom given to some of the smallest species, some are known by the names Macaw, Cockatoo, Parrakeet, Lory, Love-bird, &c. See these heads. But some of these names are very vaguely applied. And although the *P.* family is regarded as consisting of a number of very natural groups, the characters and limits of these groups have not yet been very well defined.

The name *P.*, in its most restricted sense, is sometimes applied only to those species which have the upper mandible very distinctly toothed, the lower mandible longer than it is high; and the tail short, and square or rounded; but this use is rather ornithological than popular, the most restricted popular use equally including long-tailed species, such as the Caroline *P.*, which are ornithologically ranked with the macaws.—The CAROLINE *P.* (*Conurus Carolinensis*) is the species of which the northern range extends far beyond all others of its tribe to the shores of Lake Michigan; although by the increase of cultivation, and the war waged against these birds for their depredations on orchards and corn-ricks, their numbers have been greatly diminished in regions where they were once plentiful. Its whole length is about 14 inches, of which about one half is occupied by the tail; the general colour is green, shaded with blue, and diversified with orange, the wing primaries almost black. It is gregarious, prefers to roost in the holes of hollow trees, and in such situations also the females lay their eggs. It seems to love salt, frequenting salt licks like pigeons. It is easily tamed, but does not acquire the power of articulation.—Of the short-tailed parrots, one of the best known is the GRAY *P.* (*Psittacus erythacus*), a West African species, about the size of a small pigeon, of an ash-gray colour, with a crimson tail. It is famous for its docility, its power of articulation and of imitating noises of all kinds, its loquacity, and its mischievousness. It is very often brought to Europe, and often lives to a great age in confinement. Individuals have been known to attain the age of nearly 100 years.—The GREEN PARROTS (*Chrysotis*), natives of the tropical parts of South America, are also among the short-tailed parrots most frequently seen in Britain.

PARROT-FISH (*Scarus*), a genus of fishes of the family *Labridæ* (q. v.) or *Cycho-Labridæ*, of oblong and massive form, with large scales, and remarkable for the structure of their jaws and

The species are numerous. Some of them feed on fuci, and some on corals, the younger branches of which they crush, so that the animal part affords them nourishment, whilst the calcareous part is rejected. They are fishes generally of brilliant colour, some of them of wonderful splendour, and have received the name parrot-fish partly on this account, and partly on account of a fancied resemblance in their jaws to a parrot's bill. Most of them are natives of tropical seas. One species is found in the Mediterranean (*S. Creticus*), the *Scarus* of the ancients, of which many wonderful stories were told, as to its love, its wisdom, its ruminating, its emitting of sounds, &c., and which was esteemed the most savoury and delicate of all fishes. It is still held in high esteem for the table. The Greeks cook it with a sauce made of its own liver and intestines.

PARRY, SIR WILLIAM EDWARD, commonly known as SIR EDWARD PARRY, a celebrated English navigator, was born at Bath, 19th December 1790. His father, who was a physician of some eminence, destined him for the medical profession; but acting on the advice of a friend, entered him as a first-class volunteer on board the *Ville-de-Paris*, the flag-ship of the Channel fleet, in 1803. After several years' service, he received his commission as lieutenant, January 6, 1810. Though thus early engaged in active service, his education had not been neglected; he had attained at school to considerable eminence in classical knowledge; and for the first five years after entering the navy, he had particularly studied French and mathematics under the chaplain's superintendence, after which he constantly employed his leisure time in nautical and astronomical studies. In February 1810, he was sent to the Arctic regions in command of a ship, for the purpose of protecting the British whale fisheries and improving the admiralty charts of those regions; but in 1813, he was recalled and despatched to join the fleet then blockading the coast of the United States. He remained on the North American station till the spring of 1817, and during this time he wrote and distributed MS. copies of a work entitled *Nautical Astronomy by Night*, in which rules were given for determining accurately the altitude of the pole by observations of the fixed stars. This work he subsequently published in London. Having returned to England too late to take part in the African exploring expedition, he was, at his urgent request, backed by the recommendations of Mr Harrow, secretary to the Admiralty, appointed to the command of the *Alexander*, under the orders of Captain John Ross in the *Isabella*, and despatched in search of the 'North-West Passage' (q. v.) in April 1818. The expedition returned to England, having made no important discoveries. The admiralty were dissatisfied with the report of Captain Ross; and P's opinion, though only communicated to his private friends, having become known to them, he was again sent out (May 1819), and this time commenced that career of discovery (see NORTH-WEST PASSAGE) which has immortalised him as the greatest of all Arctic explorers. P. on his return to Britain was hailed with the utmost enthusiasm, and was made commander (4th November 1820) and a member of the Royal Society. He subsequently made a second and a third voyage to the same regions, but effected nothing further of importance. P. now devoted himself to the discharge of his duties as hydrographer, but such labours were too monotonous for one of his temperament, and he accordingly prepared a plan of an expedition for reaching the north pole, which being submitted to the admiralty and approved of

Parrot-fish (*Scarus aspid*).

teeth, the jaws being divided into halves by a median suture, the teeth incorporated with the bone in crowded quincuncial order, the surface even and polished in some species and rough in others, the oldest teeth forming the trenchant border of the jaw, and being succeeded by others as they are worn away, whilst new ones are formed behind.

to the Jewish rites—prohibitions only to be bought off by heavy bribes. In return, the Magi were cordially hated by the Jews, and remain branded in their writings by the title of demons of hell (*Kidushin*, 72 a.). To accept the instruction of a Magian is pronounced by a Jewish sage to be an offence worthy of death (*Shabb* 75 a.; 156 b.). This mutual animosity does not, however, appear to have long continued, since in subsequent times we frequently find Jewish sages (Samuel *the Arian*, &c.) on terms of friendship and confidence with the later Sassanide kings (cf. Moed Katan, 26 a. &c.). From the period of its re-establishment, the Zoroastrian religion flourished uninterruptedly for about 400 years, till, in 651 A.D., at the great battle of Nahavand (near Ecbatana), the Persian army, under Yezdegerd, was routed by the Calif Omar. The subsequent fate of those that remained faithful to the creed of their fathers has been described, as we said before, under GUEBRES. At present, some remnants inhabit Yazd and Kirman, on the ancient soil of their race; others, who preferred emigration to the endless tribulations inflicted upon them by the conquering race, found a resting-place along the western coast of India, chiefly at Bombay, Surat, Nawsari, Achmedabad, and the vicinity, where they now live under English rule, and are recognised as one of the most respectable and thriving sections of the community, being for the most part merchants and landed proprietors. They bear, equally with their poorer brethren in Persia, with whom they have of late renewed some slight intercourse for religious and other purposes—such as their Rivayets or correspondences on important and obscure doctrinal points—the very highest character for honesty, industry, and peacefulness, while their benevolence, intelligence, and magnificence outvies that of most of their European fellow-subjects. Their general appearance is to a certain degree prepossessing, and many of their women are strikingly beautiful. In all civil matters they are subject to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when the holy language of Zend is used by the priests, who, as a rule, have no more knowledge of it than the laity.

We have spoken of the leading fundamental doctrines as laid down by their prophet. Respecting the practical side of their religion, we cannot here enter into a detailed description of their very copious rituals, which have partly found their way into other creeds. Suffice it to mention the following few points. They do not eat anything cooked by a person of another religion; they also object to beef, pork, especially to ham. Marriages can only be contracted with persons of their own caste and creed. Polygamy, except after nine years of sterility and divorce, is forbidden. Fornication and adultery are punishable with death. Their dead are not buried, but exposed on an iron grating in the Dokhma, or Tower of Silence, to the fowls of the air, to the dew, and to the sun, until the flesh has disappeared, and the bleaching bones fall through into a pit beneath, from which they are afterwards removed to a subterranean cavern.

Ahuramazdiao being the origin of light, his symbol is the sun, with the moon and the planets, and in default of them the fire, and the believer is enjoined to face a luminous object during his prayers. Hence, also, the temples and altars must for ever be fed with the holy fire, brought down, according to tradition, from heaven, and the sully of whose flame is punishable with death. The priests themselves approach it only with a half-mask (Penom) over the face, lest their breath should defile it, and never touch it with their

hands, but with holy instrumenta. The fires are of five kinds; but however great the awe felt by Parsees with respect to fire and light (they are the only eastern nation who abstain from smoking), yet they never consider these, as we said before, as anything but emblems of Divinity. There are also five kinds of 'Sacrifice,' which term, however, is rather to be understood in the sense of a sacred action. These are—the slaughtering of animals for public or private solemnities; prayer; the Daruns sacrament, which, with its consecrated bread and wine in honour of the primeval founder of the law, Hom or Heomoh (the Sanscr. *Soma*), and Dahman, the personified blessing, bears a striking outward resemblance to the sacrament of the Lord's Supper; the sacrifice of Expiation, consisting either in flagellation, or in gifts to the priest; and, lastly, the sacrifice for the souls of the dead. The purification of physical and moral impurities is effected, in the first place, by cleansing with holy water (*Nirang*), earth, &c.; next, by prayers (of which sixteen, at least, are to be recited every day) and the recitation of the divine word; but other self-castigations, fasting, celibacy, &c., are considered hateful to the Divinity. The ethical code may be summed up in the three words—purity of thought, of word, and of deed: a religion 'that is for all, and not for any particular nation,' as the Zoroastrians say. It need hardly be added, that superstitions of all kinds have, in the course of the tribulations of ages, and the intimacy with neighbouring countries, greatly defiled the original purity of this creed, and that its forms now vary much among the different communities of the present time.

Something like a very serious schism, however, has lately broken out in the Parsee communities, and the modern terms of Conservative and Liberal, or rather bigot and infidel, are almost as freely used with them as in Europe. The sum and substance of these innovations, stoutly advocated by one side, and as stoutly resisted by the other, is the desire to abolish the purification by the Nirang—a filthy substance in itself—to reduce the large number of obligatory prayers, to stop early betrothal and marriage, to suppress the extravagance in funerals and weddings, to educate women, and to admit them into society. Two counter alliances or societies, the 'Guides of the Worshippers of God' and 'the True Guides' respectively, are trying to carry out at this moment, by means of meetings, speeches, tracts, &c., the objects of their different parties.

The literature of the Parsees will be found noticed under PERSIAN LANGUAGE AND LITERATURE, and ZEND-AVESTA. Besides the latter, which is written in ancient Zend, and its Gujarati translation and commentaries, there are to be mentioned, as works specially treating of religious matters, the *Zardusht-Namoh*, or Legendary History of Zerdusht; the *Sadder*, or Summary of Parsee Doctrines; the *Dabistan*, or School of Manners; the *Desattr*, or Sacred Writings, &c. All these have been translated into English and other European languages.

On the influence Parsism has had upon Judaism and its later doctrines and ceremonial, and, through it, upon Christianity and Mohammedanism—which besides drew from it directly—we cannot dwell here at any length. So much, however, may be stated, that the most cursory reading of the sacred Parsee books will shew, in a variety of points, their direct influence upon the three Semitic creeds. Of works treating on the subject of this article, we mention principally, Hyde, *Vet. Rel. Pers. Hist.* (Oxon. 1760, 4to); Ouseley, *Travels in the East* (Lond. 1819; Anquetil du Perron, *Exposition des Vignes des*

the civil wars, its possession was constantly disputed, until after 1690, when the Parsons family was finally established in possession of the castle and adjoining lands. About this time, Birr returned two members to parliament, but the privilege was a temporary one. The castle has been rebuilt. The modern P. is one of the handsomest and best built and appointed inland towns in Ireland, with two handsome churches, and several meeting-houses, a nunnery, a handsome pillar with a statue of the Duke of Cumberland, a town-hall, a library, literary institute, a model and other schools. But the great attractions of P. are the castle, the observatory, and the laboratory of the Earl of Rosse (q. v.). P. is an important corn-market, a considerable centre of inland commerce; but with the exception of a distillery and brewery, it is almost entirely without manufactures. It is a large military station, and is also the seat of a Union workhouse.

PÂRSWANÂTHA, the twenty-third of the deified saints of the Jains, in the present era. He and *Mahavira*, the twenty-fourth, are held in highest esteem, especially in Hindustan. In a suburb of Benares, called Belupura, there is a temple honoured as the birthplace of Pârs'wanâtha. See JAINAS.

PART, in Music. When a piece of music consists of several series of sounds performed simultaneously, each series is called a part.

PARTERRÉ, in gardens laid out in the old French style, the open part in front of the house, in which flower-beds and closely-cut lawn were intermingled according to a regular plan.

PARTHENOGENESIS (from the Gr. *parthenos*, a virgin, and *genesis*, the act of production) is a term invented by Professor Owen to indicate propagation by self-splitting or self-dividing, by budding from without or within, and by any mode save by the act of impregnation; the parthenogenetic individuals being sexless or virgin females. See the article GENERATIONS, ALTERATION OF. For many remarkable facts in relation to parthenogenesis in insects, the reader is referred to Professor Owen's eighteenth lecture, *On the Comparative Anatomy and Physiology of Invertebrate Animals*; and to Siebold, *On Parthenogenesis*, translated by Dallas.

PÂR'THENON, the temple of Minerva at Athens; one of the most celebrated of the Greek temples, and usually regarded as the most perfect specimen of Greek architecture. Many of the sculptures have been brought to England, and are now in the British Museum. See GRECIAN ARCHITECTURE.

PARTHENOPEAN REPUBLIC (from *Parthenope*, the oldest name of the city of Naples) was the name given to the state into which the kingdom of Naples was transformed by the French Republicans, 23d January 1799, and which only lasted till the following June, when the invading army was forced to retreat.

PARTHIA, anciently a country of Western Asia, lying at the south-east end of the Caspian Sea, from which it was separated by a narrow strip, known as Hyrcania, now forms the northern portion of the province of Khorassan, and is an almost wholly mountainous region. Its rivers are merely mountain torrents, which are supplied by the melting snow on the Elburz range during winter and spring, but are mostly dry in summer and autumn.

The original inhabitants are believed to have been of Scythian race, as shewn by their language as well as by their manners, and to belong to the great Indo-Germanic family. If this be the case, as is very probable, the term Parthian, from its analogy

to the Scythian word *parthe*, banished, seems to indicate that they were a tribe who had been driven to P. out of Scythia (i. e., Central Asia). The Parthians, during the time of the Roman Republic, were distinguished by primitive simplicity of life and extreme bravery, though at the same time much given to bacchanalian and voluptuous pleasures. They neglected agriculture and commerce, devoting their whole time to predatory expeditions and warfare. They fought on horseback, and after a peculiar fashion. Being armed solely with bows and arrows, they were rendered defenceless after the first discharge; and, to gain time for adjusting a second arrow to the bow, turned their horses, and retired, as if in full flight, but an enemy incautiously pursuing, was immediately assailed by a second flight of arrows; a second pretended flight followed, and the conflict was thus carried on till the Parthians gained the victory, or exhausted their quivers. They generally discharged their arrows backwards, holding the bow behind the shoulder; a mode of attack more dangerous to a pursuing enemy than to one in order of battle. The Parthians first appear in history as subject to the great Persian Empire. After the death of Alexander the Great, P. formed part of the Syrian kingdom, but revolted under Antiochus II., and constituted itself into an independent kingdom under the *Arsacids* (see ARSACES), 250 B.C., a race of kings who exercised the most completely despotic authority ever known, treating their subjects as if the vilest of slaves; yet so accustomed did the Parthians become to this odious rule, that some of the later monarchs, who had received a Roman education, and after their accession treated their subjects with ordinary justice and humanity, were completely despised. The capital of the Parthian monarchy was Hecatompylos ('the city of the hundred gates'), now Damgan. The Parthian dominion rapidly extended to the Euphrates on the west and the Indus on the east, and became a most powerful and flourishing empire; Seleucia, Ctesiphon—the capital of the Persian emperors of the Sassanids—and other celebrated cities date their rise from this period, and soon eclipsed, in size and splendour, the ancient Hecatompylos. In spite of repeated attacks on the part of the Romans, the Parthians maintained their independence (see CRASSUS, SURENA); and though Trajan, in 115–116 A.D., seized certain portions of the country, the Romans were soon compelled to abandon them. In 214 A.D., during the reign of Artabanus IV., the last of the Arsacids, a revolt, headed by Ardshir, son of Babegan, broke out in Persia, and the Parthian monarch, beaten in three engagements, lost his throne and life, while the victor substituted the Persian dynasty of the SASSANIDS (q. v.) for that of the Arsacids. Some scions of the Parthian royal family continued for several centuries to rule over the mountainous district of Armenia, under the protection of the Romans, and made frequent descents upon Assyria and Babylonia; but their history is obscure and of little importance.

PARTIAL LOSS, in the law of Marine Insurance, is a loss which is not total; and therefore the insurer is not entitled to abandon or give up the remains of the ship or cargo, and claim the entire insurance money; but he is bound to keep his ship or goods, and claim only in proportion to his actual loss or damage.

PÂR'TICIPLE (Lat. *participium*, part-taking) the name of a class of words which have the meaning of a verb with the form of an adjective. The name is said to have been given from their partaking of the nature both of a verb and of an adjective.

time appointed; but this only happens when some unforeseen and urgent reason exists, as that one of the partners has become a lunatic, or has proved grossly dishonest, or the object of the partnership cannot be carried out. Mere differences of opinion on minor matters are no ground for seeking a dissolution. The partners may make any kind of arrangement between themselves that they think proper; but if these are unusual and special stipulations, there is no certainty of securing the same being adhered to, without a formal deed or indenture of partnership being executed. Thus, it is common to stipulate as to the capital each is to contribute, and as to the proportion of profits he is to receive, as to what is to be done in case of the death of a partner, &c. Unless a stipulation is made to the contrary, the rule is, that the death of one of the partners dissolves the partnership. So does his bankruptcy. It is also a rule that no new partner can be introduced without the consent of the rest. There is also a peculiarity in the law of England as to the form of remedy—the rule being, that partners cannot sue each other in a court of law in respect of partnership transactions, but the only remedy is by a bill in Chancery. As against third parties, whatever may be the secret arrangements between themselves, the rule is, that any partner can bind the firm in all matters which are within the scope of the partnership, each being by the nature of the contract made the agent of all the rest for business purposes. Thus, any one may accept a bill in the name of the firm, provided such be one of the modes of doing business. It is, however, to be borne in mind, that the firm is only bound by one of the partners in those matters which are strictly within the proper business of the firm, which is an important qualification of the general power. Within the above limits, each partner can bind the rest of his copartners, however imprudent or foolish may be his act, for it is one of the implied conditions, that all have full confidence in each other. It follows from this principle, that the firm is liable for the dealings of each partner on its behalf within the scope of the partnership, that each is liable to the full extent for all the debts of the firm; in short, each is liable to his last shilling for the solvency of the firm. Hence, it is often of importance for a partner, on leaving the firm, to know how to terminate this liability. The rule is, that as regards all strangers, a notice in the *Gazette* is good notice: but as between the firm and those who have had dealings with it, the *Gazette* notice is of no use, unless it can be proved that the party had actual notice given to him—and hence a circular notice sent to customers announcing the fact of retirement, is the only course effectual.

The practice of individuals entering into large associations, now called joint-stock companies, which were originally only extended partnerships, has led to a separate code as to these being framed for the United Kingdom. See JOINT-STOCK COMPANIES. The practice of limiting the liability of partners or shareholders in joint-stock companies had of late years led to the belief, that a similar restriction might well be extended to ordinary partnerships, and accordingly a bill was introduced into parliament in 1864 to enable this to be done. By that bill—which, however, did not extend to Scotland—any person may place a specific sum of money in a firm, and become a partner, with liability limited to such sum. Such limited partner, however, is to refrain from all participation in the conduct of the business, otherwise he will become a general partner. Nor is his name to appear in the title of the firm. But for his own security and satisfaction, he is entitled to examine the books, so as to ascertain

the profits. In this kind of partnership, certain particulars are to be registered with the registrar of joint-stock companies, such as the name and place of business of each partner, describing whether he be a general or limited partner, the nature of the business, and the place of carrying it on, the name of the firm, the amount lent by each limited partner, and the time at which it is to be repaid. This kind of partnership may be renewed from time to time on fresh registration. Any clerk or servant may be allowed to share profits without incurring the liability of partner. The register-books of this class of partnerships are to be open to the registrar. These partnerships may sue in the name of the firm. This step may be considered at present in the light of an experiment, but it is expected to take firm root in modern business, as it enables capitalists and traders to unite on a more rational basis, and combine their several interests and capacities much more effectually than could be done heretofore.

In Scotland, the law of partnership, though in its essential features the same with the law of England, differs in one or two particulars. The partnership is treated as a distinct person in law, the partners being only its sureties or cautioners; and the consequence of this is, that in actions by or against the firm, the individual partners need not be named, though in practice one or two of them generally are named. Each partner may also sue the firm as if it were a distinct person; and the firm may be made bankrupt without any of the partners being sequestrated. See Paterson's *Comp. of E. & S. Law*, p. 214.

PARTRIDGE (*Perdix*), a genus of gallinaceous birds, of the family *Tetraonidae*, having a short, strong bill, naked at the base; the upper mandible convex, bent down at the tip; the wings and tail short, the tarsi as well as the toes naked, the tarsi not spurred.—The COMMON P., or GRAY P. (*P. cinerea*), is the most plentiful of all game-birds in Britain, and becomes increasingly plentiful as cultivation is extended, whilst the range of the moorfowl is restricted. It is not found in the Outer Hebrides. On the continent of Europe, it is abundant in almost all districts suitable to its habits, from Scandinavia to the Mediterranean, and is found also in the north of Africa, and in some parts of the west of Asia. It varies considerably in size; those found in rich lowlands being generally the largest, and about 12½ inches in entire length; whilst those which inhabit poorer and more upland districts are rather smaller. The female is rather smaller than the male. The upper parts of both are ash-gray, finely varied with brown and black; the male has a deep chestnut crescent-shaped spot on the breast, which is almost or altogether wanting in the female. The male has also the throat and sides of the face bright rust-colour, of which there is less in the female. A variety called the Mountain P. has the plumage brown. The P. is seldom found far from cultivated land. It feeds on grain and other seeds, insects and their larvae and pupæ, and the pupæ of ants are very generally the food sought at first for the young. It pairs early in spring, at which time fierce conflicts take place among the males. The nest is usually on the ground, among brushwood and long grass, or in fields of clover or corn, and generally contains from twelve to twenty eggs. The young run as soon as they are hatched. Both parents shew a very strong attachment to their young, and great courage in repelling assailants; they have also recourse, like many other birds, to stratagem, to draw off the most powerful and dangerous enemies, such as dogs, in another direction, fluttering close before them as if broken-winged, whilst the brood escape. Until the end of autumn, the parent birds and their brood

Bezon, died while he was little beyond infancy. He had two sisters—the elder, Gilberte, Madame Perier, afterwards his biographer; the younger, Jacqueline, who became a nun of Port Royal, under the celebrated Mère Angelique, sister of Antoine Arnauld. From childhood, Blaise gave evidence of extraordinary abilities; and when he reached his eighth year, his father resigned his office at Clermont, and came to Paris, in order personally to direct the boy's education. For the purpose of concentrating all the boy's efforts upon languages, his father kept out of his reach all books treating the subject of mathematics, for which he had early evinced a decided taste; and it is recorded that by his own unaided speculations, drawing the diagrams with charcoal upon the floor, he made some progress in geometry. One account represents him as having thus mastered the first thirty-two propositions of the first book of Euclid's *Elements*—a statement which carries its own refutation with it. Thenceforward, he was permitted freely to follow the bent of his genius. In his sixteenth year, he produced a treatise on Conic Sections, which extorted the almost incredulous admiration of Descartes. In his nineteenth year, he invented a calculating-machine; and turning his attention to the novel questions as to the nature of fluids, which Torricelli's theories had raised, he produced two essays, which, although not published till after his death, have established his reputation as an experimental physicist. His father having accepted an office at Rouen, P. was there brought much into intercourse with a distinguished preacher, Abbé Guillebert, a member of the Jansenists, but a man of great eloquence, a great master of ascetic theology, from whom and from other members of the same rigid sect, as well as from the writings of Arnauld, St Cyran, and Nicole, P.'s mind received a deeply religious turn; and his health having suffered much from excessive study, he gave himself up in great measure to retirement and theological reading, and to the practice of asceticism. The death of his father, and his sister Jacqueline's withdrawal to Port Royal, confirmed these habits; and it is to this period that we owe his magnificent though unfinished *Pensées*, which have extorted the admiration even of his unbelieving, and therefore unsympathising critics. Having fully identified himself with the Jansenist party, he was induced (1655) to take up his residence at Port Royal, although not as a member of the body, where he resided till his death, entirely given up to prayer and practices of mortification, among which practices may be mentioned that of wearing an iron girdle, studded with sharp points, which he forced into his flesh whenever he felt himself assailed by sinful thoughts. In the controversy to which the condemnation of Arnauld by the Sorbonne (1655) gave rise, P. took a lively interest; and it was to this controversy that he contributed the memorable *Lettres Provinciales*, published under the pseudonym of Louis de Montalt. These famous Letters (eighteen in number, not reckoning the nineteenth, which is a fragment, and the twentieth, which is by Lemaistre), are written, as if to a provincial friend, on the absorbing controversial topic of the day. The first three are devoted to the vindication of Arnauld, and the demonstration of the identity of his doctrine with that of St Augustine. But it was to the later letters that the collection owed both its contemporary popularity and its abiding fame. In these P. addresses himself to the casuistry and to the directorial system of Arnauld's great antagonists, the Jesuits; and in a strain of humorous irony which has seldom been surpassed, he holds up to ridicule their imputed laxity of principle on the obligation of restitution, on simony, on probable opinions, on

directing the intention, on equivocation and mental reservation, &c. In all this, he professes to produce the authorities of their own authors. Of the extraordinary ability displayed in these celebrated Letters, no question can be entertained; but the Jesuits and their friends loudly complain of their unfairness, and represent them as in great part the work of a special pleader. The quotations, with the exception of those from Escobar, were confessedly supplied by P.'s friends. It is complained that many of the authors cited are not Jesuits at all; that many of the opinions ridiculed and reprobated as opinions of the Jesuit order, had been in reality formally repudiated and condemned in the Society; that many of the extracts are garbled and distorted; that it treats as though they had been designed for the pulpit and as manuals for teaching, works which in reality were but meant as private directions of the judgment of the confessor; and that in almost all cases, statements, facts, and circumstances are withheld, which would modify, if not entirely remove, their objectionable tendency. See JESSURA. To all which the enemies of the Jesuits reply by arguments intended thoroughly to vindicate Pascal. P. himself entertained no compunctious feeling for the production of these Letters, but even at the approach of death declared his full satisfaction with the work, such as it was. His later years were made very wretched by continued, or at least frequently recurring hypochondria, under the influence of which he suffered from very painful fantasies, which he was unable to control. His strength was completely worn out by these and other infirmities, and, prematurely old, he died at the early age of thirty-nine in Paris, in the year 1662. His *Pensées sur la Religion, et sur quelques autres Sujets*, being unfinished, were published with suppressions and modifications in 1669; but their full value was only learned from the complete edition which was published at the instance of M. Cousin (2 vols., 8vo, Paris, 1844). Of all his works, the *Lettres Provinciales* have been the most frequently reprinted. They were translated into Latin in the lifetime of P. by Nicole, under the pseudonym of a German professor, 'Wilhelm Wendrock;' and an edition in four languages appeared at Cologne, in 1684.

PASCO, or CERRO DE PASCO, an important mining city in Peru, in the department of Junin, stands at an elevation of upwards of 13,000 feet above sea-level, 80 miles north-east of Lima in a direct line, but upwards of 130 miles by the winding mountain road. It consists of a collection of huts spread over an area that has been hollowed out and perforated in all directions by mines. The number of the inhabitants varies according to the state of the mines; being sometimes considerably more than 12,000, and often much less. The Cerro, or 'mountain knot,' of Pasco rises in Sacshuanata, 16,000 feet above the level of the sea. Coal is found in the vicinity.

PAS-DE-CALAIS (Fr. for Strait of Dover), a department in the north of France, bounded on the N. by the department of Nord and the Strait of Dover, and on the W. by the Strait of Dover and the English Channel. Area, 1,631,590 acres, of which 883,300 acres are cultivated, and 236,707 in meadows. Pop. (1862) 724,338. The surface is level, with the exception of a ridge of hills running from the south-east to the north-west, ending in Gris-nez Cape (q. v.), and forming the watershed between the North Sea and the English Channel. The rivers, which are of no considerable length, are the Scarpe and Lys in the basin of the North Sea, and the Authie and Canche belonging to the basin

ball-shaped blackish-purple flowers.—These plants emit, when bruised, a pungent smell; and contain, as their principal constituent, a peculiar pungent essential oil, which, in combination with *Anemonic Acid*, forms an acrid and very inflammable substance called *Anemonine*, or *Pulsatilla Camphor*, and

county of Cork, Ireland, which has risen into importance chiefly as a watering-place, and as the shipping-port and marine suburb of the city of Cork, from which it is distant, by the Cork and Passage Railway, about 6 miles. As the river above P. is not navigable for ships above 400 or 500 tons burden, ships of higher tonnage discharge their cargoes at Passage. It is also a ship-building station. Pop. in 1861, 2287; of whom 1879 were Catholics; 375, Protestants of the Established Church, and the rest of other religious denominations.—There is another small town of the same name, EAST PASSAGE, near the mouth of the Suir, in the county of Waterford, Ireland.

PASSAGLIA, CARLO, a Roman Catholic theologian of great eminence, who has obtained much notoriety in connection with the recent movement for the unity of Italy, is a native of the duchy of Lucca, where he was born May 2, 1812. His origin is very humble, and he entered extremely young as a scholar of the Jesuit Society, of which he was enrolled a member in the year 1827. Having obtained much distinction in the schools of the order, and having, as is usual with its members, taught for some time in the lower schools, he completed his theological studies in the Roman College, and was appointed Professor of Canon Law, and eventually of Dogmatical Theology. His reputation for learning stood in the very first rank of Roman Catholic theology, and his lectures were exceedingly admired for their eloquence and erudition, but were considered in some respects too diffuse for the class of pupils who frequented his school. During the temporary withdrawal of the Jesuits from Rome in 1848—1851, P. with some of his brethren came to England, where he taught theology to the young brethren of his order, and on the re-establishment of the Jesuits in the Roman College, he resumed possession of his chair. During the discussions which preceded the definition of the doctrine of the Immaculate Conception of the blessed Virgin Mary (q. v.), P. prepared an elaborate treatise as well on the doctrine as on the history of that question, which was published at the cost of the Roman government. Soon afterwards, however, the dissatisfaction which was felt at the unsuitable character and method of his lectures, led to some remonstrance on the part of the authorities of the order, and ultimately to his resignation of the professorship of theology. Still, however, he continued a member of the Society; and the pope, who felt a warm friendship for him, established in the Roman university a special chair of Philosophy for him, of which he took possession, but which he did not long retain. In the end of 1858, or early in 1859, he left the Society of the Jesuits, and soon afterwards he began to take an active part in the discussions as to the temporal power of the pope; and with a view to an accommodation of the difficulties in which it was involved, he undertook a voluntary mission to Turin, which, however, led to no results. Having fallen under suspicion in Rome, and his house having been invaded by a domiciliary visit of the police, he withdrew from Rome, and settled at Turin, where he established a journal, entitled *Il Mediatore*, which in 1864 was still in course of publication. He was elected a member of the Turin parliament, in which career, however, his success hitherto has fallen far short of his reputation.

P.'s principal works are the treatise on the Immaculate Conception already referred to (4 vols. 4to); a treatise (Latin) on the Primacy of St Peter (8vo, 1850); a scholastic treatise entitled *Commentarius Theologicus de Partitione Divina Voluntatis* (8vo, Rome, 1851); an apology for the cause of Italian unity, entitled *Pro Causa Italica*; ad

Pasque Flower (*Anemone pulsatilla*).

is sometimes used in medicine. *Pulsatilla* is a favourite medicine of the homoeopaths. *Easter Eggs* are coloured purple in some places by the petals of the pasque flower.—More acrid than any of the species just named is *Pulsatilla patens*, which occasionally even blisters the skin.

PASQUINADE, an anonymous or pseudonymous publication of small size, sometimes printed, sometimes only posted up or circulated in manuscript, and having for its object the defamation of a character, or at least the turning of a person to ridicule. The name is derived from *Pasquino*, a tailor remarkable for his wit and sarcastic humour, who lived in Rome towards the close of the 16th c., and attracted many to his shop by his sharp and lively sayings. Some time after his death, a mutilated fragment of an ancient statue, considered to represent Menelaus supporting the dead body of Patroclus, was dug up opposite his shop, and placed at the end of the Braschi Palace, near the Piazza Navoni. It was named after the defunct tailor, and thus the practice originated of affixing to it placards containing satires and jests relative to the affairs of the day—the pope and the cardinals being favourite victims of the invisible satirist. It was, and still continues to be, the only outlet which the Roman has for his opinions and feelings. One or two may be quoted as specimens of the mordant style of the Pasquin statue. 'Great sums,' said the satirist one day, in an epigram addressed to Pope Paul III., 'were formerly given to poets for singing; how much will you give me, O Paul, to be silent?'—On the marriage of a young Roman called Cesare to a girl called Roma, the statue gave the following advice: 'Cave, Caesar, ne tua Roma respublica fiat.' Next day the rival statue of Marforio, in the Capitol, replied: 'Cæsar imperat; to which Pasquin with exquisite malice retorted: 'Ergo coronabitur.'

PASSAGE, West, a seaport town upon the western shore of the estuary of the river Lee, in the

is not, properly speaking, a bird of passage; its migrations being apparently altogether consequent on the failure of the supplies of food in one locality, and the necessity of seeking it in another, and not connected with the breeding season or the season of the year. Its power of flight is very great, and it is supposed to be able to sustain a long flight at the rate of sixty miles an hour. Passenger pigeons have been killed in the neighbourhood of New York, with their crops full of rice, which they must have collected in the fields of Carolina or Georgia not many hours before. It is not, therefore, very wonderful that wanderers of this species should occasionally appear in Britain and in other regions far from their native abode. The nest of the P. P. in the American forests generally consists of a few dry twigs placed in a fork of the branches of a tree, and containing two eggs, sometimes only one egg. They breed two or three times in a season. In the backwoods, vast numbers of pigeons building in one breeding-place, many nests, sometimes 100 or more, are often to be seen in one tree. These great breeding-places extend over a vast tract of forest, sometimes not less than forty miles in length; but in the more cultivated parts of the United States the P. P. builds singly and not in communities. The numbers of birds forming the communities of the western forests surpass calculation. Flocks of them are to be seen flying at a great height in dense columns, eight or ten miles long; and there is reason to suppose, from the rapidity of their flight, and the number of hours taken by a column in passing a particular spot, that in some of their great migrations the column, a mile broad, is more than 150 miles long. Their roosting-places, as well as their breeding-places, are of prodigious magnitude. The graphic descriptions of Wilson and Audubon are too long to be quoted; but there is perhaps nothing of the kind so wonderful in relation to any species of bird. The noise of wings and of cooing voices is as loud as thunder, and is heard at the distance of miles. It drowns the report of guns. The multitudes which settle on trees, break down great branches by their weight, so that it is dangerous to pass beneath. They crowd together, alighting one upon another, till they form solid masses like hogsheads, and great numbers are killed when the branches break. The inhabitants of the neighbouring country assemble, shoot them, knock them down with poles, stifle them by means of pots of burning sulphur, cut down trees in order to bring them in great numbers to the ground, eat them, salt them, and bring their hogs to fatten on them. Wolves, foxes, lynxes, cougars, bears, raccoons, opossums, polecats, eagles, hawks, and vultures all congregate to share the spoil. The flesh of the P. P. is of a dark colour, but tolerably pleasant. That of young birds is much esteemed. The nestlings are in general extremely fat, and are sometimes melted down for the sake of their fat alone. The food of the P. P. consists chiefly of beech-mast and acorns, but it readily eats almost any kind of nut, berry, or seed.

PASSENGERS BY LAND AND SEA. The law affecting passengers by land, in a carriage or public conveyance, may be stated as follows: The owners of the railway or other carriage do not contract to carry the passenger with perfect safety; they do not warrant that he will not be injured; but they merely contract to carry him without any negligence on their part. Hence, in case of accident, though it is not strictly correct in point of law to assume that the accident arose from some negligence of the carrier, unless there is evidence to support it, this presumption is in point of fact always made,

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and it lies on the carrier to shew that it was from no fault or negligence on his part that the accident happened. As questions of negligence must almost always be decided by a jury, and their prepossessions are against admitting the idea that accidents arise from any cause except negligence of the carrier—which is a wholesome doctrine—it seldom ever happens that a railway or public company attempt to dispute their responsibility on that ground. The rule is that a railway company is responsible for the negligence of any of their servants; and hence, in case of accidents, all passengers injured, and in case of death, the parent, husband, wife, or children of the deceased passenger, invariably make a claim of compensation, except when the accident was caused by the passenger's own personal negligence. For while a carrier is bound to use due care to carry the passenger with safety, it is equally true that the passenger is at the same time bound to take ordinary care of himself, and not act in a rash or foolish way, so as to lead to an accident. Before railways and canals were in use, it was sometimes doubted whether it was not the duty of carriers by coach to carry all persons who presented themselves and offered to pay their fare; but this notion is exploded, and even railway companies are not bound to carry everybody who comes, but merely to give reasonable accommodation to the ordinary number, otherwise their liability would be enormous on particular occasions where crowds assemble. Their interest is usually a sufficient inducement on such occasions to provide the accommodation required. A passenger has a right to carry along with him luggage (q. v.).

In the case of passengers by sea, a peculiar code has been constructed, owing to the peculiarity of their situation. The fundamental rule of the common law is the same as on land carriage—that the carrier by sea does not engage to carry with absolute safety, but merely to omit nothing in his power, and to use due care. The legislature, however, has passed statutes to regulate the duties of carriers by sea, the latest being 18 and 19 Vict. c. 119. The act, however, only applies to voyages from the United Kingdom to places out of Europe, and not to the Mediterranean Sea. Payment of the passage money must be made before commencing the voyage, and the owners are not bound to forward stowage passengers by the very ship contracted for, if an equally eligible ship be offered, provided, however, that families are not to be separated. If the ship is disabled on the voyage, the owners are bound to repair the ship in six weeks, or send on the passengers. If the passengers exceed 300, a medical practitioner must be on board, and the provisions must be according to a certain scale of diet. The Emigration Commissioners require to inspect emigrant ships, and to give a certificate as to fitness. As to passenger steamers in this country, a certificate is required from the Board of Trade, specifying the voyage and number of passengers allowed to be carried.

PASSERINE BIRDS. See INSESSORES.

PASSING-BELL, a bell tolled during the death agony of a dying person, at the moment of the soul's 'passing' from earth to its eternal abode. Its use in Catholic countries is to invite the hearers to join in the prayers which are ordered 'for the dying in their hour of agony,' and which the priest with his attendants recite in the death chamber. See BELL.

PASSING-NOTES, in Music. In passing from one chord to another, an intervening note, not belonging to either chord, may be used to assist the progression. Such a note is called a *passing-note* or

crucifixes, statues, and other sacred representations are veiled during the whole of Passion-tide.

PASSIVE TITLE, in the Law of Scotland, is the liability of an heir, or one who represents and interferes with the estate of a deceased person, to pay all the debts of the deceased. It was considered that so great an opportunity of fraud in secreting the goods of a deceased person existed, that the heir was presumed to be liable for all the debts of the deceased, unless he took good care to give up an inventory, and so shew what property there was. The barbarous doctrine of holding an heir universally liable has latterly been much restricted; but the explanation is entirely technical.

PASSOVER (*Pesach, Pascha*), the first and greatest of the three annual feasts (*Regalim*) instituted by Moses, at which it was incumbent upon every male Israelite to make a pilgrimage to the house of the Lord. It was celebrated on the anniversary of the Exodus from Egypt—i.e., on the 14th day of Nisan, otherwise called Abib, the period of the first full moon in the spring—and lasted eight days. In commemoration of the incidents connected with the great event of the liberation of the people, it was ordained that unleavened bread only should be eaten during this festive period, whence it also bore the name *Chag hamazoth* (Feast of Unleavened Bread); and, further, that a lamb one year old, and free from all blemish, roasted whole, together with bitter herbs, should form the meal in every house on the eve of the feast. Prayers and thanksgivings, all with a reference to the redemption from bondage, accompanied the repast, at which the members of the family or families who had joined in the purchase of the lamb had to appear in travelling garb. At a later period, a certain number of cups of red wine were superadded to this meal, to which, as its special ceremonies and the order of its benedictions were fixed, the name *Seder* (arrangement) was given. The name P. was more strictly limited to the first day, in which the paschal lamb was entirely consumed, the reserving of any part of it to the next day being expressly forbidden (Ex. xii. 10); and the name Feast of Unleavened Bread belonged rather to the remaining days, on which other animal food was eaten; but the names were often used indiscriminately.

The P. is generally regarded by Christian theologians as at once a sacrifice and a sacrament, and in the former character as an eminent type of the sacrifice of Christ. The death of Christ at the very time of the P. is regarded as corroborative of this view, which is indeed plainly adopted in certain passages of the New Testament, as John xix. 36, and 1 Cor. v. 7, in which last place our Saviour is designated 'Christ our Passover.' The P. is regarded as typical of Christ, in its connection with the deliverance of Israel from the bondage of Egypt, held to typify our salvation from the bondage of sin; in its being a sacrifice, and that of a lamb without blemish—the perfection of the paschal lamb, as of the other sacrificial victims, being supposed to signify the perfection of the great sacrifice; and in many other minor particulars, of which one is that referred to in John xix. 36, that no bone of the paschal lamb was to be broken.

The Paschal meal, as at present celebrated among the Jews, has more the character of a hallowed family-feast, with reference, however, to the great national event. The greater part of those—it may be added here—who live out of the Holy Land celebrate it on the two first evenings, as, owing to the uncertainty prevalent at one time with respect to the fixing of the new moon by the Sanhedrim at

Jerusalem, it was ordained that the 'Exiles' should celebrate all their festivals—except the Day of Atonement—on two successive days, a law still in force among the orthodox. The regulations of the 'lamb for each house,' the travelling garb, &c., are abrogated, but many further symbolical tokens have been superadded; reminiscences, as it were, both of the liberation from Egypt, and the subsequent downfall of the sanctuary and empire. The order of prayers and songs to be recited on these evenings has also received many additions, and even mediæval German songs have crept in, as supposed to contain a symbolical reference to the ultimate fate of Israel. See *HAGGADA* (*shel Pesach*), *FESTIVALS*, *EASTER*, *LORD'S SUPPER*.

PASSPORT, a warrant of protection and permission to travel, granted by the proper authority, to persons moving from place to place. Every independent state has the right to exclude whom it pleases from its territory, and may require that all strangers entering it be furnished with properly authenticated documents, shewing who they are, and for what purpose they are visiting the country. Passports are sometimes issued by the ministers and consuls of the country which the traveller intends to visit, which cannot, however, be done without the consent or connivance of the state of which the holder of the instrument is a subject; they properly proceed from the authorities of the state to which the traveller belongs, and ought to bear the *visa* or countersignature of the minister or consul of the country which he is about to visit. In many European states no one is allowed to go abroad without a passport from his government authorising him to leave the country—a provision used as a means of detaining persons charged with crime. In some states, passports are even required by the natives to enable them to go from place to place in their own country. The regulations of different states have varied much regarding the use of passports; and of late years the general tendency has been to relax the stringency of the regulations connected with them. Since the facilities of travelling have so greatly increased, it seems to have become the prevalent opinion that the passport system tends to obstruct the free intercourse that is desirable between citizens of different countries; while it is ineffectual to prevent the entrance of dangerous or suspicious characters, who can obtain passports on false pretences, or make their way in without them. Within the United Kingdom no passports are required; but for a British subject travelling in many parts of the continent, they are requisite. Till of late years, the greater part of British subjects travelling abroad used to be furnished with passports from the ministers or consuls of the countries which they purposed to visit; the lord provost of Edinburgh was also in the way of issuing passports to Scotchmen. Of late years the passport most used by British subjects is that of the British Secretary of State for Foreign Affairs, which is now granted to any British subject on application of a banking company in the United Kingdom, or on the recommendation of the chief magistrate of any corporate town in the United Kingdom, or of any magistrate or justice of the peace, physician, surgeon, solicitor, notary, or minister of religion, who shall certify that the applicant is the person that he professes to be. If the applicant be a naturalised British subject, he must be known to the Foreign Secretary, or recommended to him by some person known to him, and his certificate of naturalisation must be forwarded to the Foreign Office. A Foreign Office passport must, as a general rule, be countersigned by the minister or consul of each country which the

pastiles, which are burned either as incense or as a means of diffusing an agreeable odour. They are composed of charcoal powder, with such aromatic gums as benzoin, labdanum, &c.; and powders of sweet-scented woods and barks, as sandal-wood, cinnamon, and especially cascarilla barks. Essential oils are also added, and the whole are worked into a paste with a little gum-mucilage, and formed into small sharp-pointed cones about an inch and a half high, and half an inch broad at the base. When perfectly dry, they are used by lighting at the point, and as they burn down an agreeable odour is given out with the smoke. Very tasteful vessels, called *pastille burners*, usually of porcelain, are made for using them. Another kind of *pastilla*, usually in the form of a small pill covered with gold or silver leaf, is used for perfuming the breath; it is made of the same kind of ingredients, excepting the charcoal.

PASTO, a town of the United States of Colombia, on a high plateau between two ridges of the Andes, 148 miles north-east of Quito. Height above sea-level upwards of 8500 feet. It is in the direct route from the Popayan Pass to Quito. Pop. about 7000.

PASTOR, a genus of birds of the Starling family (*Sturnidae*), differing from starlings in the compressed and slightly-curved bill. In habits, as in characters, they are very nearly allied to starlings. The name *P.* is supposed to be derived from their

scandal, or some apprehended danger to the faith or to morals. To this class belong many of the remains of the early fathers, especially in the Western Church. In some countries the government, as formerly in Austria, claimed a right to exercise a censorship over the pastoral letters to be issued by the bishops. This right, however, is regarded by churchmen as a usurpation, and although submitted to, is admitted only under protest. See *PLACETUM REGIUM*, *FEBRONIANUM*.

PASTORAL POETRY is that kind of poetry which professes to delineate the scenery, sentiment, and incidents of shepherd-life. It is highly probable that the first attempts to give a rhythmic expression to human feeling were to some extent of this character. Men were originally shepherds, and their festal songs and hymns would derive at least substance and imagery from their primitive occupations; but as a distinct branch of poetic art, pastoral poetry was not cultivated till a comparatively late period; for although critics are fond of pointing to the lives of the Hebrew patriarchs, and to the story of Ruth, as specimens of the antiquity of the pastoral in the East, yet, as these profess to be history, and not fiction, they can be instanced only to prove that the *material* for this kind of poetry existed from the earliest ages. In point of fact, it was only after innocence and simplicity had passed away, or were thought to have passed away, from real life, that men began, half from fancy, and half from memory, to paint the manners of the past as artless, and the lives of their ancestors as constantly happy. It was thus the *Brass Age* that made the *Golden*. The oldest specimens of the classic pastoral are the *Idylls* of Theocritus (q. v.), which appeared about 275 B. C.—long after Greece had produced her masterpieces in epic narrative, in the war ode, and almost all other kinds of the lyric, in tragedy, comedy, history, philosophy, and rhetoric. Theocritus was imitated by Bion and Moschus, whose pastorals approximate in form to the drama. Among the Latins, the refined and courtly Virgil, in the reign of Augustus, wrote his *Bucolica* or *Ecloques*, on the model of his Greek predecessors; but, however beautiful and melodious the verses of these urban writers are, we cannot suppose for a moment that the rude shepherds and shepherdesses of Italy or Sicily indulged in such refined sentiments, or spent their time so poetically as there they are made to do. Virgil, we may rest assured, is as far from giving a genuine picture of pastoral life in his verse, as any modern poet who prates of Chloë and Phyllis.

During the middle ages, pastoral poetry in this artistic, and therefore conventional sense of the term, was almost unknown; but with the first glimpse of reviving classicism, the pastoral reappears. The earliest specimens are afforded by Boccaccio (q. v.), about the first modern Italian who studied Greek. It is to the countrymen of Boccaccio that we owe the creation of the pastoral drama, of which there is no trace in ancient literature. The *Favola di Orfeo* of Politian (q. v.), performed at the court of Mantua in 1483, is the first dramatic poem which pretends to represent the sentiments, incidents, and forms of pastoral life. Critics have forgotten this work when they make Tansillo the inventor of the *favola pastorale*, or *boscareccia*, on account of his *I due Pellegrini* (1539), or Agostino Beccari, whose pastoral comedy, *Il Sacrificio*, was played at Ferrara in 1554. However, it is true that the extraordinary popularity of Beccari's piece originated a crowd of *favole boscareccie*, the finest and most poetical of which is the *Aminta* of Tasso, represented at the court of Ferrara in 1572. A later, but hardly less famous production

Rose-coloured Pastor (*Pastor roseus*).

being frequently seen with flocks of sheep. The only European species is the ROSE-COLOURED P., or Rose-coloured Ouzel (*P. roseus*), a rare visitant of Britain and of the northern parts of Europe, and more common in the north of Africa, Syria, and India than in any part of Europe.

PASTORAL LETTER, a letter addressed either at certain stated times, or on the occurrence of some notable occasion, by a 'pastor,' but especially by a bishop to the clergy under his jurisdiction, to the laity of his flock, or to both. Of the former class, in the Church of Rome, are the so-called *Lenten Mandates*, or *Instructions*, issued before the commencement of Lent, and making known the regulations enacted for the observance of the Lenten fast, the dispensations granted, and the devotions and other pious works prescribed. Such also are the letters issued by a bishop on many of the chief festivals of the year. It is usual for bishops, besides their stated letters, to address to their clergy or people instructions suited to any particular emergency which may arise, and sometimes to take occasion from the issuing of the stated pastoral letter to offer instruction on some topic of importance which may engage public attention at the time, on some prevalent abuse or

the obligations of the pastors themselves, and which is therefore designed for the training and preparation of the candidates for the pastoral office. The other part of pastoral theology, which might perhaps better be called Popular Theology, comprises the objective teaching which is to be employed in the instruction and direction of the flock committed to the pastor's charge. This branch of theology has long formed a leading portion of the training of candidates in the Evangelical Churches of France and Germany; and a valuable manual for Catholic studies has recently appeared in Vienna, *Lehrbuch der Katholischen Pastoral*, von Dr A. Kerschhammer, 8vo, Wien. 1863.

PASTRY, articles of food in which the chief part consists of a paste made of flour. This would of course apply to bread, but it has been limited by custom to such lighter articles as are made by the pastry-cook, and chiefly to those in which the paste is made to assume a light flaky character by the addition of butter, &c., and by the mode of working it up. The commonest kind is made of a dough of flour and water, into which butter or lard is worked by hand, in the proportion of six ounces to the pound. The finest kind is usually termed *puff paste*, and considerable skill is required to make it well, for it depends, next to the goodness of the materials, upon lightness of hand in kneading the ingredients together. These ingredients consist of fine wheat flour and butter in the proportion of four ounces of butter to a pound of flour, with cold water just sufficient to make a good stiff elastic dough; this is rolled out with a *rolling-pin*, and double the previous quantity of butter is then spread over it. It is then rolled up and lightly kneaded, so as to work the butter in thoroughly. Coolness is very important in making pastry; a marble slab is therefore most desirable for making it upon. The thinner it is rolled out before the butter is then spread the better, because when it is put in the oven the laminae which have been formed by folding or rolling up the butter with the dough, separate by the disengagement of the watery vapour, and the thinner and lighter the flakes are the better is the puff paste. Another kind is called *short paste*; in this the flour is made warm, and the butter or lard used is often melted, and a little sugar and an egg or two are added. This, when baked, has none of the flaky character of puff paste, but it is better adapted for meat and some other kinds of pies which require to be baked without a dish. Game pies, with elaborately-decorated crusts, are made of this pastry.

PASTURAGE, in English Law called Common of Pasture, is classed among rights of common or profits *à prendre*, and is the right of one who is not the owner of land to put his sheep or cattle on such land to feed there. In Scotland it is called a servitude of pasturage. In both countries the right can be established by prescription, in England of thirty years, and in Scotland of forty years. Where the parties entitled to pasturage dispute as to their respective proportions of cattle, the suit to redress the matter is called in Scotland an action of 'sowming and rowming.'

PASTURES (Lat. *pasco*, to feed) are fields or tracts of land devoted to the feeding of oxen, sheep, and other herbivorous animals, which eat the grass and other herbage as it grows. Grass is grown sometimes in the rotation with grain and other crops, when it remains on the ground for one or more years, is frequently mown during the first summer, and grazed afterwards, but is again ploughed up to be succeeded usually by oats or wheat. For such purposes, rye-grass, red, white, yellow, and alaike clovers, are used either alone or mixed in

varying proportions. On the uplands of Great Britain, wherever from any cause grain crops cannot profitably be grown, and throughout many of the richest plains and valleys, especially of England and Ireland, there are thousands of acres of land which have been under grass from time immemorial. Such permanent pastures are estimated to occupy fully 14,000,000 acres in England, nearly 8,000,000 in Scotland, and about 9,000,000 in Ireland. Sometimes they have been self-sown, occasionally they have been laid down with care, seldom are they as highly cultivated and liberally managed as they should be. The best of them are used for feeding heavy bullocks; those of somewhat poorer description are often grazed by dairy stock; whilst the down or upland pastures are especially profitable for sheep. It has now become a common practice, and is every year becoming more and more general, to give additional food of various kinds to animals fed on pastures. Even cattle grazing on the richest pastures are supplied with linseed cake, &c., to hasten the process of fattening, and to improve their quality; roots are given to sheep when fattening for the market, and hay to those which are to be kept as stock; whilst when oats or beans are cheap, many sheep-farmers find it advantageous to give them even to the hardy stock of exposed hill-pastures. All pastures are much improved by thorough drainage. The application of farmyard dung, soil, lime, and almost every sort of top-dressing is beneficial. Irrigation is sometimes profitable, and in some other countries is far more common and far more requisite than in Britain. Rich pastures on which oxen are fed are injured by sheep, which reject the coarsest grass, and pick out the finest; but a few horses turned into them during the autumn or winter help to consume the coarser tufts. The coarsest and rankest grass may once or twice a year be cut over by the scythe; and either made into rough hay, or if left on the ground, the cattle, when it has partially dried, will readily eat it up. A dressing of lime and salt scattered over the rougher parts of the fields in autumn will sweeten the herbage, and induce the stock to eat it down regularly. Moss, which is a great pest in many pastures, may be got rid of by penning sheep, well fed with swedes, cake, or corn, regularly over the field; or by harrowing the surface in several different directions during January or February, applying then a top-dressing of soil or dung, and in March or April sowing some clover or other seeds, which will be firmed down by the bush harrow, clod-crusher, or heavy roller. The droppings of the cattle ought to be broken up and scattered over the ground. Rich pastures intended for the fattening of cattle ought not to be used during winter, but allowed to become luxuriant before the cattle are turned upon them in spring. Very lean animals, whether oxen or sheep, cannot with advantage be at once placed on very rich pasture, but must be gradually fitted for it. In some of the hill districts of Scotland, devoted to sheep-farming, increased productiveness has resulted from breaking up portions of the pasture, and after two or three crops have been taken, laying them down as pastures again. All good pastures produce a very mixed herbage, not consisting merely of one kind of grass, but of several or many, with clovers and other plants. Different species of Meadow-grass (*Poa*), Fescue (*Festuca*), Foxtail (*Alopecurus*), Oat-grass (*Avena*), Cock's-foot (*Dactylis glomerata*), Rye-grass (*Lolium*), Hair-grass (*Aira*), Vernal-grass (*Anthoxanthum*), and Timothy or Cat's-tail (*Phleum*), are among the most common grasses of British pastures. Yarrow (*Achillea millefolium*) is very abundant in some

partridges, and water-fowl in Los Serranos. But by far the most important animals are the guanaco (wild llama), the nandou (Patagonian ostrich), and the gama, a kind of deer.

Inhabitants.—The Patagonians have been hitherto described only in the most general terms, and in many cases very inaccurately. Little was known of their appearance, habits, and employments. Recent information, however, enables us definitively to class the Patagonian monster of the early voyagers with Gulliver's giants. The tallest of the tribes are composed of men who, on an average, are nearly six feet in height; while in other tribes the average height is an inch or two less. There is reason to believe, however, that instances of unusual height are as rare in P. as in Europe. The peculiar costume of the Patagonians, which in most instances consists of a long mantle of hide, drooping with unbroken outline from their shoulders almost to the ground, gives them the appearance of extraordinary height. Many of the tribes also are large in body, while they have comparatively short extremities; and these, when seen on horseback, covered with their long mantles, seem almost gigantic in stature. Their colour is a reddish brown. Their shoulders are large, and well thrown back; the chest is well expanded; the head large, the forehead open and prominent; the mouth large; the eyes black, and generally large; the nose frequently hooked, long, and thin, though among some tribes it is, as a rule, broad at the nostrils; the ears are large, and elongated by the heavy ornaments of their own manufacture which they wear in them, and which are so large that they often rest on the shoulders. The hair, generally black, coarse, and lank, is sometimes rolled together on the top of the head. Their houses, called *roukaks*, are formed of three rows of stakes driven into the ground. The middle row is higher than the others, and the three rows are tied together with strings of hide, and so kept in their place. This frail framework is covered with hides which reach the ground on all sides, and are fastened to it by small stakes of bone. At nightfall, guanaco hides are spread on the ground within the tents, and the men and women laying aside their mantle, their only garment, and which sometimes serves as a blanket, go to sleep under the same roof and in the same apartment. Bathing in cold water every morning, throughout the whole year, is a custom to which men, women, and children conform; and although the morning bath may not free them from vermin—a national characteristic—yet it has the effect of preventing disease, and of enabling them the more easily to endure the severities of winter. The men, when out on the hunt, shew wonderful courage and adroitness; when not so engaged, they live in perfect idleness. They are incredibly greedy and voracious. They deck their heads, and ornament them into the perfection of ugliness, greasing their hair with the grease of the horse. They pull out the hair of the eyebrows and beard, and paint their bodies with black, red, and other colours. The Patagonians are nomads; some of the tribes, however, as the *Puelches*, are nomads from choice, not from necessity, for their district or headquarters is abundantly fertile. The more important tribes are nine in number; and each tribe is led and governed by a cacique, whose power extends also to numerous sub-tribes. Each family and each man, however, is entirely free, and can remain attached to a certain tribe or separate from it at pleasure. The Patagonians form themselves into these communities for the purpose of self-defence. Wars are so frequent that security is found only in union. The chiefs are considered as the fathers, the leaders, and the rulers of the tribe; and are selected

chiefly on account of their bravery in battle. The more powerful tribes frequently make raids upon settlements, and carry off great numbers of horses and cattle. They subsist upon the flesh of horses, nandous, gamas, and guanacos; the flesh they eat is generally raw. Their choice morsels are the liver, the lungs, and the raw kidneys, which they prefer to eat dished in the warm blood of the animal, or in curdled milk seasoned with salt. Roots and fishes are also eaten, but raw flesh is the staple. They are hospitable among themselves, though bitterly hostile to Christians. Their only manufactures are mantles of guanaco hide, and saddles, bridles, stirrups, and lassos. The lassos and the articles of harness are chiefly plaited, and evince wonderful ingenuity and nicety of execution. The mantles are made for the most part by a tribe called the *Tcheouelches*. They are mainly made by women, who first in a rude and primitive manner tan the leather, then put the hides together, and sew them with the small sinews of the animal itself. Afterwards the men rub them with a stone for the purpose of suppling them and flattening the seams, and then ornament them with capricious designs in red and black paint. The Indians obtain a few cattle and horses in exchange for these mantles, which are no less prized by neighbouring tribes than they are by the Hispano-Americans. Clothed in one of them, the natives expose themselves to the most intense cold without receiving any injury.

The religion of the Patagonians is dualistic. They believe in two gods or superior beings—the God of Good and the God of Evil; or, in their own language, *Vita Ouñetrou*—the Great Man, and *Honacouou* or *Gualetchou*—the Cause of Evils. The former they consider the creator of all things, and they believe that he sends the sun to them as his representative, as much to examine what takes place among them, as to warm their bodies and renew the brief spring verdure. The moon is another representative, whose office it is to watch them and give them light. Believing that they themselves require a great deal of 'watching,' they further believe that every country on the globe has its own sun and moon, or special watchers. They have no idols. Their faith is transmitted from father to son, and its observances are strictly attended to. They are full of strange superstitions. They dread the north and the south, believing that from the south come evil spirits, who take possession of the souls of the dying, and bear them off to the north. They consider that the best means of ensuring a long life is to go to sleep with the head lying either to the east or to the west. They also believe that all natural phenomena have their causes in their own conduct, and that all misfortunes are sent as punishments due to moral delinquencies. Thus, the fearful tempests that sweep over their plains inspire them with the greatest dread. During the prevalence of the hurricane, they crouch together in their huts; fear makes them inactive, and they do not stir from their grovelling position even to cover themselves with the hides which the tempest strips from their huts. The Patagonian never eats or drinks without turning to the sun, and throwing down before him a scrap of meat or a few drops of water, and using a form of invocation. This form of invocation is not fixed, but it hardly ever varies, and is to the following effect: 'O Father, Great Man, king of this earth! give me favour, dear friend, day by day; good food, good drink, good sleep; I am poor myself, are you hungry? Here is a poor scrap; eat if you wish.' The Patagonians observe two great religious fêtes—one in summer, in honour of the Benevolent Deity; and another in autumn, in honour of the God

PATELLA AND PATELLIDÆ—PATENT.

which the outer is the broader and deeper) correspond to the articular surface of the two condyles.

This bone is liable both to dislocation and fracture.

Dislocation may occur either inwards or outwards; but it is most frequent in the outward direction. The displacement may be caused either by mechanical violence, or by too sudden contraction of the extensor muscles in whose conjoined tendon it lies, and is most liable to occur in knock-kneed, flabby persons. It may be readily detected by the impossibility of bending the knee, and by the bone being felt in its new position, and, except in one rare variety, the dislocation is capable of being reduced without any difficulty. Fracture of the patella may (like dislocation) be caused either by muscular action or by mechanical violence.

Fracture by muscular action is the more common of the two forms, and occurs thus: A person in danger of falling forwards, attempts to recover himself by throwing the body backwards, and the violent action of the extensors (chiefly the *rectus*) snaps the patella across, the upper fragment being drawn up the thigh, while the lower portion is retained *in situ* by that portion of the common tendon which is continued from the patella to the tubercle of the tibia, and which is called the *ligamentum patellæ*. The treatment consists in relaxing the opposing muscles by raising the trunk, and slightly elevating the limb, which should be kept in a straight position.

In consequence of the great difficulty of bringing the broken surfaces into exact apposition, as may be readily understood from the accompanying figure, it is very difficult to obtain bony

reunion of the parts, and the case generally results either in mere ligamentous union or in no true union at all.

PATELLA and PATELLIDÆ. See **LEVER.**

PATEN (Lat. *patina*, a dish), the plate employed for the elements of bread in the Eucharistic service. Anciently it was of considerable size; and while the practice of the **OFFERTORY** (q. v.) continued, there was a special paten for the bread-offering. In the Roman Catholic Church, in which the unleavened wafer-bread is used, and the communion is distributed from a distinct vessel called **PRY** (q. v.), the paten is a small circular plate, always of the same material with the chalice. It is often richly chased or carved, and studded with precious stones. It is used only in the mass.

PATENT is an exclusive right granted by the crown (in letters patent or open, whence the name) to an individual to manufacture and sell a chattel

or article of commerce of his own invention. The policy of the present law of patents has latterly been much canvassed, and it has been suggested that, instead of the present monopoly, with the drawback of litigation to which it uniformly gives rise, the use of all inventions should be dedicated to the public at once, and the inventor rewarded by a pension from the state, according to the merits and utility of the invention. The present law allows the inventor to have a monopoly of his invention for fourteen years, with a further privilege at the end of that time, provided he has not been sufficiently remunerated, to have the patent renewed for a further term of fourteen years. That some mode of rewarding the individual whose perseverance and ingenuity have enabled him to discover a new invention should be established, is universally admitted, but whether it should be at the expense of that part of the public who are purchasers, and therefore benefited by his discovery, or by the public at large in the shape of a pension, is a matter still undecided. The evils of the present law are that there is a great deal of uncertainty in the mode of ascertaining what is a new invention. Hence, when a patent has been granted, if it is of such a nature as to lead to competition, infringements are almost matters of course, and the only mode of discovering and checking the infringement is so tedious, costly, and ineffective, that inventors generally pass their lives in constant litigation, fighting in detail a succession of imitators who often have nothing to lose by defeat, and therefore exact all the greater burden on the legitimate manufacturer. It has been said that not more than three patents per cent are remunerative. A royal commission has latterly been engaged in inquiries as to the best mode of remunerating inventors, and improving the law in reference to infringements; but it is doubtful how far the subject is capable of being put on a better footing, so many difficulties being inherent in it. The crown seems always to have enjoyed the prerogative right to grant monopolies, and this had been so greatly perverted in the time of Elizabeth, that the popular clamour led to a statute in the following reign, having for its object to prevent the crown in future making any grants of that kind which should be prejudicial to the interests of trade. By that act an exception was expressly made in favour of new inventions. At first the judges construed grants of monopoly to inventors very strictly; but afterwards it was seen that they were for the benefit of trade, and were dealt with more liberally. An important modification of the law was introduced by a statute of Queen Anne, which required every inventor to describe in detail the nature of the invention in an instrument called a specification. Another statute of 5 and 6 Will. IV. c. 83, further altered the law by allowing parties who had a difficulty in separating what was new from what was old in their invention to enter an express disclaimer of that part which was not new. But the most important alteration was made in 1852, by the statute of 15 and 16 Vict. c. 83, which reduced the fees, and otherwise improved the practice attending the obtaining of patents for the United Kingdom. Before stating shortly the substance of this act, it may be observed that there has always been a difficulty in defining what is an invention that is patentable—a difficulty which no act of parliament can get rid of, for it is inherent in the subject-matter. It has been held that a patent must be not merely a discovery of a new substance or article of food, but it must be a combination of processes producing some new result, or an old result by different means. It is of the essence of the patent that it be entirely new, that is,

detailed exposition and commentary of it, and in all the services not only of the Roman Missal, Breviary, Ritual, Processional, and Ordinal, but in all the occasional services prescribed from time to time, it is invariably introduced. In the Rosary (q. v.) of the Virgin Mary it is combined with the Hail Mary, the prayer addressed to the Virgin (whence the larger beads of the 'Rosary' are sometimes called *Pater-Nosters*), and perhaps the most usual of all the formal shorter devotions among Roman Catholics is the recitation a stated number of times of the 'Pater,' with one or more 'Ave Marias,' generally concluding with the *Doxology*. The form of this prayer as commonly used by Protestants concludes with the clause, 'for Thine is the kingdom, and the power, and the glory for ever. Amen.' This clause is not used by Roman Catholics. Of the two gospels—that of Matthew and that of Luke—in which the delivery of the prayer by our Lord is related, that of Luke has not this clause; and even in the Gospel of Matthew it is found only in the later MSS., in which it cannot be doubted that it is a modern interpolation. It was retained, however, in Luther's German translation, and in the Authorised Version, whence its use became common among Protestants.

PATERSON, a city of New Jersey, U.S., at the falls of the Passaic River, on the Morris Canal, and New York and Erie Railway, 17 miles north-west of New York, a well-built city, with 8 cotton factories, 10 machine factories, extensive paper-mills, and factories of cotton, duck, flax, hemp, &c., to which the falls of the Passaic furnish abundant water-power. The half of the locomotives made in the United States are manufactured here. The city contains county buildings, an academy, bank, 2 newspapers, and 16 churches. Pop. in 1860, 19,588.

PATERSON, WILLIAM, the most celebrated, after John Law (q. v.), of the commercial schemers of the 17th c., was, like Law, a Scotchman, and is said to have been born in the parish of Tinwald, Dumfriesshire, about 1660. Of his early history nothing is known beyond the fact, established by conclusive evidence, that he possessed himself of an extensive and minute knowledge respecting the institutions and commerce of foreign countries. His first appearance in history is at the time when he laid before the merchants and capitalists of London the complete draught of his scheme of banking. The scheme was favourably, nay even eagerly, adopted by them, and after being modified so as to render it practically serviceable, became the basis of an institution which, in 1690, was incorporated under the name of the 'Bank of England.' P., however, soon became, for reasons now unknown, disconnected with the Bank. His next project was the renowned Darien Scheme (q. v.), which received the royal sanction in 1695, and came to ruin in 1701. Its disastrous failure so affected P. as to produce temporary lunacy, and after his recovery he lived in retirement. Nothing further is known concerning him.

PATHOLOGICAL ANATOMY, or the anatomy of diseased organs, is included in, but must not be confounded with pathology, as until comparatively lately was often the case. It is merely a section—although a most important section—of pathology, contributing (as Professor Vogel has well remarked) 'to practical medicine the solid materials from which to construct a basement, without having the power to erect a perfect edifice.' Pathological anatomy enables the surgeon to decide whether a suspicious tumour is malignant or of a comparatively harmless nature, and

in many other ways is of the greatest importance to surgery; and although at first sight it might appear to be of small importance in relation to Therapeutics, this is not in reality the case. Scientific treatment necessarily demands an accurate knowledge of the material changes which lie at the foundation of the various morbid symptoms. Hence pathological anatomy not only forms a portion of the positive basis of Therapeutics, but it also points out the processes by which the different altered parts may be gradually restored to their normal condition. It not merely indicates what requires healing, but in many cases also the course that must be adopted in order to aid the curative tendency of nature. It likewise serves as a check on therapeutics, exposing, in a most conclusive manner, the absurdity of many pretended methods of cure. It points out, for example, that in a certain stage of inflammation of the lungs (Pneumonia) a fibrinous fluid separates from the blood, and by its coagulation renders a portion of the tissue of the lung impermeable to air; and further that it requires several days for this coagulated matter to resume the fluid condition and to be removed. If any one should assert—and such assertions have often been made—that in this stage of the disease he could apply a remedy which would cure the patient in a few hours, a very slight knowledge of pathological anatomy would shew the folly of such an assertion. The best English works on this subject are Vogel's *Pathological Anatomy of the Human Body*, and Jones and Sieveking's *Manual of Pathological Anatomy*.

PATHOLOGY (from the Gr. *pathos*, disease, and *logos*, a discourse) is that department of medicine which treats of the doctrine of morbid actions or diseases. In this country the term is so far restricted as not to include the causes, treatment, &c., of diseases, but the most eminent French and German writers regard it as equivalent to 'the Theory and Practice of Medicine,' and consider it as treating not only of the classification, causes, symptoms, and physical signs of diseases, but as also including their seat, the phenomena which precede and follow them, their progress, their duration, their modes of termination, the different forms in which they occur, their complications, the changes to which they give rise in the solids and fluids of the body, and their treatment.

PATMOS, a bare and rocky island in the *Ægean* Sea, about 45 miles in circumference. It belongs to the group called the Sporades, lies to the south of Samos, and is now called Patino, but in the middle ages *Palmosa*, although there is now only one palm-tree in the whole island. It is celebrated as the place to which the apostle John was exiled, and where he saw the visions recorded in the Book of Revelation. On the top of a mountain stands the famous monastery of 'John the Divine,' half way up to which a cave is pointed out to the traveller in which, according to tradition, the apostle received his revelations. See Ross's *Reisen auf den Griechischen Inseln des Agäischen Meeres*, and Guérin's *Description de l'île de Patmos*, &c. (Paris, 1856).

PATNA, or more correctly, **PATTANA** (i.e., the town), an important trading town of Hindustan, capital of a British district of the same name, stands on the right bank of the Ganges, 10 miles east of Dinapur, and 377 miles by land, and 464 miles by water, north-west of Calcutta. The city proper, forming a quadrangle, extends a mile and a half along the river-side, and is half that extent in breadth. P. is generally supposed, however, to include the suburbs, which stretch on each side

his son property to trade on, which would be his own; and laterly a son acquired for himself whatever he gained in military service, or by the discharge of certain civil functions. In all matters belonging to the *jus publicum* a son was independent of his father; he could vote at the elections, hold the most important offices of state, or command the army. He could also be a tutor, tutory being considered a *munus publicum*. In later times, a son promoted to the consular dignity ceased to be under the restraints of paternal control, but, unlike an emancipated son, he retained his rights of succession. Lawful children were entitled to aliment from their parents; an obligation attached in the first instance to the father and mother, and, failing them, to the grandfather. Until the time of Justinian, illegitimate children had only a claim for support against their mother; that emperor gave them a right to demand aliment from their father.

In no modern system has the paternal power been carried so far as under the Roman law. According to the French 'Code Civile,' a child is under the authority of his parents till majority or emancipation; up to that time he cannot quit the paternal residence without leave of his father, except for enrolment in the army at 18 years of age. Majority is attained at the age of 21, but a minor is emancipated by marriage. At 15, a minor may be emancipated by his father, or, if his father be dead, by his mother, by a simple declaration before a magistrate. The father possesses somewhat extensive powers of chastisement. He may obtain a warrant to arrest his child under 16, and detain him in prison for a month; and an order may be obtained for the incarceration for six months of a child above 16, on cause shewn to the satisfaction of the magistrate. Parents are entitled to the usufruct of their children's property till the age of 18 or emancipation, subject to the burdens of maintenance and education; but this right does not extend to property acquired by the industry of the children, or bequeathed by a stranger under the condition of an exclusion of parental interference.

By the law of England, a father is guardian to his lawful children in minority, though this right ceases to some extent at 14. He has the power of moderate chastisement. As guardian, he receives the rents of any real estate which the child may possess, which he must account for when majority is attained. The paternal power never extends beyond majority, and, to some effect, marriage acts as an emancipation. A father may by deed appoint a guardian to such of his children as are unmarried at his death till they attain majority.

In Scotland a father has a general control over the persons of his children during pupilarity; that is, till the age of 14 in the case of sons, and 12 in the case of daughters. He may fix their place of residence, direct their education, and inflict reasonable chastisement. The limits of the *patria potestas* as regards children who have attained puberty, but are under 21 years of age, are not very exactly defined; but it seems to be understood that in ordinary circumstances minors are not entitled to choose their own place of residence in defiance of paternal authority. The father is administrator-in-law, and tutor and curator of his children, unless in the case of an estate left by a stranger and placed under separate management. This guardianship ceases on majority, or on the marriage of a daughter.

PATRIARCH (Gr. *patriarches*, the head of a tribe) is the name given to the heads of the families in the antediluvian period of Scripture history, and is still more familiar as the designation in Jewish history of the three progenitors of the Jewish people, Abraham, Isaac, and Jacob. In the

later history of the Jews, too, after the destruction of Jerusalem, the name was used to designate the heads of the Sanhedrim, one of whom, the patriarch of the west, resided at Tiberias, in Galilee, and the other, the patriarch of the Eastern Jews, at Babylon. The most familiar use of the word, however, is in the history of the Christian church. It is the name given to the bishops of certain great Metropolitan (q. v.) Sees, who not only held rank beyond other metropolitans, but also enjoyed a jurisdiction almost identical with that of the metropolitan in his own province over all the metropolitans themselves (with their provinces) included in their district, which was called a PATRIARCHATE. The name patriarch originally seems to have been given commonly to bishops, or at least was certainly given in a less special sense than what it eventually assumed; nor can the date at which the title first assumed its now received use be exactly determined. It is certain, however, that the name and the office were both recognised before the Council of Nice, at which time, as we learn from the sixth canon, the patriarchal sees, acknowledged by 'ancient custom,' were three in number, Rome, Antioch, and Alexandria. After the translation of the seat of empire to Byzantium, thenceforward called Constantinople, that see, originally subject to the metropolitan of Heraclea, obtained, first metropolitan, and afterwards patriarchal rank; and eventually established a precedence over the patriarchs of Antioch and Alexandria, being second only to Rome. The contests between the patriarchs of Rome and Constantinople were among the chief causes of the GREEK SCHISM (q. v.). To these four patriarchates was added a fifth, in the year 451, that of Jerusalem, which was formed out of the ancient patriarchate of Antioch. The limits of these five patriarchates can only be loosely assigned. The authority of a patriarch was, in the main, that of a metropolitan, but extended over the metropolitans themselves. He had a right to consecrate the metropolitans, and to preside over the councils of his patriarchate. After the Greek Schism, and particularly after the establishment of the Latin Kingdom of Jerusalem, Latin prelates were appointed with the title and rank of patriarch in the four great Eastern sees. It was hoped that the union of the churches, effected at the Council of Florence, would have put an end to the contest thus created; but that union proved transitory, and the double series of patriarchs has been continued to the present day. The Nestorian and Eutychian sections of the Eastern Church, too, have each their own patriarch, and the head of that portion of the former, which in the 16th c. was reconciled with the Roman see, although known by the title of *Catholicos*, has the rank and authority of patriarch. After the separation of the Russian Church from that of Constantinople, the name and authority of the metropolitan in the end was transformed into that of patriarch. But the office was suppressed by Peter the Great.

Besides these, which are called the Greater Patriarchates, there have been others in the Western Church known by the name of Minor Patriarchates. Of these the most ancient were those of Aquileia and Grado. The latter was transferred to Venice in 1451; the former was suppressed by Benedict XIV. France also had a patriarch of Bourges; Spain, for her colonial missions, a patriarch of the Indies; and Portugal a patriarch of Lisbon. These titles, however, are little more than honorary.

In the non-united Greek Church, the ancient system of the three patriarchates of Constantinople, Antioch, and Jerusalem is nominally maintained, and the authority of the patriarchs is recognised by their own communion. But the jurisdiction-limits

knot of gold, the roses being enamelled alternately white within red, and red within white, and in the centre is an imperial crown surmounting a harp of gold, from which the badge is suspended. The *Badge or Jewel* is of gold, and oval; surrounding it is a wreath of shamrock proper on a gold field; within this is a band of sky-blue enamel charged with the motto of the order, *QUI SEPARABIT MDCCLXXXIII.* in gold letters, and within this band a saltire gules (the cross of St Patrick), surmounted by a shamrock or trefol alpped vert, having on each of its leaves an imperial crown or. The field of the cross is either argent, or pierced and left open.

Order of St Patrick.

A sky-blue *Ribbon*, worn over the right shoulder, sustains the badge when the collar is not worn. The *STAR*, worn on the left side, differs from the badge only in being circular in place of oval, and in substituting for the exterior wreath of shamrocks eight rays of silver, four of which are larger than the other four. The *MANTLE* is of rich sky-blue tawinet, lined with white silk, and fastened by a cordon of blue silk and gold with tassels. On the right shoulder is the *HOON*, of the same materials as the mantle.

The order is indicated by the initials K. P.

PATRIPASSIANS (Lat. *pater*, father, and *passus*, suffered), the name of one of the earliest classes of anti-Trinitarian sectaries, who, in maintaining the oneness of the Godhead, held that all that is ascribed in the Scriptures, according to the Trinitarian exposition, to any of the Three Persons, is in reality true of the one Principle, whom alone these sectaries admitted, being in consequence called 'Monarchians' (Gr. *monos*, one, and *arché*, principle). The leader of this sect was Praxeas, a native of Phrygia, who lived in the end of the 2d century. The name P., for which the Greek equivalent was *Patropaschite*, was in some sense a sobriquet, being founded on what their antagonists regarded as the absurd consequence derivable from their doctrine—viz., that as it was true to say that Jesus, in whom dwelt the Logos, or the Son, suffered, therefore it

would be true on their principles to say that the Father suffered. The sect in this particular form was chiefly known in Rome; but their principles are in the main the same with those of the Sabellians. In Rome, Praxeas was succeeded by Noetus, but the party does not appear to have been numerous or influential.

PATRO'CLUS. See **ACHILLES**.

PATROL is a detachment of five or six soldiers, fully armed, sent out, under a sergeant, from the main guard or picket to traverse the streets of a garrison town, &c., and arrest disorderly persons or soldiers out of barrack without proper passes. Prisoners are taken to the guard-house, and brought before the town-major. In a besieged fortress, *patrols* are strong bodies of men employed to promenade the lines of defence, and watch against any assaults on the part of the enemy.

PATRON (Lat. *patronus*, from *pater*, father), among the Romans originally signified a citizen who had dependents, who were called *clients*, attached to him. Before the time of the Laws of the Twelve Tables, the most frequent use of the term *patronus* was in opposition to *libertus*, these two words being used to signify persons who stood to one another in the relation of master and manumitted slave. The Roman was not denuded of all right in his slave when he freed him, a tie remained somewhat like that of parent and child, and the law recognised important obligations on the part of the *libertus* towards his patron, the neglect of which involved severe punishment. In some cases the patron could claim a right to the whole or part of the property of his freed man. The original idea of a patron apart from the manumitter of slaves continued to exist. A Roman citizen, desirous of a protector, might attach himself to a patron, whose client he thenceforward became; and distinguished Romans were sometimes patrons of dependent states or cities, particularly where they had been the means of bringing them into subjection. Thus the Marcelli were patrons of the Sicilians, because Claudius Marcellus had conquered Syracuse and Sicily. The patron was the guardian of his client's interests, public and private; as his legal adviser, he vindicated his rights before the courts of law. The client was bound, on various occasions, to assist the patron with money, as by paying the costs of his suite, contributing to the marriage portions of his daughters, and defraying in part the expenses incurred in the discharge of public functions. Patron and client were under an obligation never to accuse one another; to violate this law amounted to the crime of treason, and any one was at liberty to slay the offender with impunity. One obvious effect of the institution of *clientela* was the introduction of an element of union between classes of citizens who were otherwise continually brought into opposition to each other. As the patron was in the habit of appearing in support of his clients in courts of justice, the word *patronus* acquired, in course of time, the signification of advocate or legal adviser and defender, the client being the party defended; hence the modern relation between counsel and client.—*Patron*, in after times, became a common designation of every protector or powerful promoter of the interests of another; and the saints, who were believed to watch over the interests of particular persons, places, trades, &c., acquired in the middle ages the designation of their patron saints. The saint in whose name a church is founded is considered its patron saint.

The term Patron has also been applied to those who endowed or supported churches and convents. See **PATRONAGE**, **ECCLESIASTICAL**.

bishop of the diocese. Patronage has always been more or less subject to alienation, transmission, and the changes incident to other kinds of property. The modern practice of patronage in the Roman Catholic church is detailed under the head *PROVISION* (q. v.).

In England, where the modified canon law, which was in use before the Reformation, is still in force, the rights of patrons do not materially differ from those which they possess in Roman Catholic countries. For some details regarding the right of presentation in England, see *ADVOWSON*.

In Scotland, at the Reformation, the rights of patrons were reserved, and presbyteries were bound by several statutes to admit any qualified person presented by the patron. The principle of these statutes was retained in the enactments introducing Episcopacy. On the establishment of Presbytery under favour of the civil war, patronage was abolished by act 1649, c. 23, and the election of the clergy was committed to the kirk-session. At the Restoration, this statute fell under the act rescissory, and patronage was replaced on its former footing. On the reintroduction of Presbytery at the Revolution, patronage was again cancelled, and the right to present conferred on the Protestant heritors and the elders of the parish, subject to the approval or rejection of the whole congregation. In consideration of being deprived of the right of presentation, patrons were to receive from the parish a compensation of 600 merks (£33, 6s. sterling), on payment of which they were to execute a formal renunciation of their rights. Only three parishes effected this arrangement with the patron, and patronage was permanently restored in all the parishes where no renunciation had been granted by 10 Anne, c. 12. This act, with modifications introduced by 6 and 7 Vict. c. 61, is now law. Should a patron fail to present for six months after the occurrence of a vacancy, the right to present falls to the presbytery *jure devoluto*. The presentee, before he acquires a right to the emoluments of the benefice, must be admitted to it by the presbytery of the bounds. He is first appointed to preach certain trial sermons, after which a day is fixed within six weeks for moderating in his call. On that day the people are invited to sign a written call to the presentee to be their minister, and however few the signatures to the call may be, the presbytery are in use to pronounce a formal judgment sustaining it. They then proceed to examine into the qualifications of the presentee, and provided the result be satisfactory, the ordination follows (if he have not been previously ordained), and he is formally admitted minister of the parish by the presiding minister. Soon after the above-mentioned act of Queen Anne, a feeling which had sprung up in favour of popular election, in opposition to patronage, led to various acts of resistance to the settlement of presentees, and brought about two considerable secessions from the Church of Scotland. It continued for a length of time to be a subject of dispute how far the right of the church to judge of the fitness of presentees could entitle her to make rules tending to disqualify them, and in particular whether she could legally make the dissatisfaction of the congregation a disqualification. For a long time prior to 1834, there had been no attempt to give effect to any dissent on the part of the congregation. In that year the law of patronage again became a ground of contention, when a majority of the General Assembly embodied their views on the subject in the so-called Veto Act, which declared that no minister was to be imposed on a congregation when a majority of heads of families and communicants should dissent from

his admission. The decision of the Court of Session, confirmed by the House of Lords, finding this act to be *ultra vires* of the General Assembly, led to the secession of 1843 and formation of the *Free Church* (q. v.). After that event, an act, 6 and 7 Vict. c. 71, commonly called Lord Aberdeen's Act, was passed to fix by a legislative provision the effect which the church courts were in future to be entitled to give to the dissent of the congregation in the collation of ministers. It is there enacted, that after the trial sermons, the presbytery shall give to the parishioners, being members of the congregation, an opportunity to state objections which do not infer matter of charge to be proceeded against according to the discipline of the church. The presbytery are either to dispose of the objections, or to refer them to the superior church judicatory; and if the objections be considered well founded, the presbytery may reject the presentee. No power is, however, given to reject him on the ground of mere dislike as such on the part of any portion of the congregation. In Scotland, patronage is in all cases a heritable right; it is transferable by disposition without infektment, but capable of being feudalised, after which it can be completely conveyed only by infektment.

In the Protestant churches of Germany, Sweden, and Denmark, patronage exists to some extent, subject to restrictions, which differ much in different localities. The right to present is sometimes divided between the patron and the consistory. The parishioners have in many instances a voice; the appointment may be entirely in their hands, or they may have merely a right to reject the presentee after he has been subjected to the ordeal of a trial sermon; and in either case this right may be exercised, according to local usage, either by the parishioners at large, by a committee of their number, or by the *Bürgermeister*. When there is no patron, the choice generally rests with the consistory in East, and with the parishioners in West Germany. Induction by the superintendent completes the right of the presentee.

In the Greek Church the right to present is generally in the hands of the bishops, excepting in Russia, where lay patronage exists to a limited extent.

PATRONYMIC (Gr. *pater*, father, and *onoma*, name), properly a name taken from one's father, but generally applied to such names as express descent from a parent or ancestor. In Sanskrit, Greek, and Latin, patronymics are very numerous. They may be derived from the name of a father, mother, grandfather, or remoter ancestor, as *Atrides*, i.e., (Agamemnon), son of Atreus; *Philyrides*, i.e., (Chiron), son of Philyra; *Æacides*, i.e., (Achilles), grandson of Æacus. The names of the founders of nations have also been used to form a sort of patronymic, as when the Romans are called *Romulidæ*. In Greek and Latin the commonest terminations of patronymics are *ides* and *ia*. Patronymics have no fewer than thirteen recognised terminations in Sanskrit. A number of the surnames in use in modern times are patronymics, as Johnson, the son of John; Thomson, the son of Thomas. Originally these names fluctuated from generation to generation, as still is, or very recently was, the case in Shetland, where Magnus Johnson's son calls himself John Magnusson or Manson. In the course of time, it was generally found more convenient to take a surname from one well-known ancestor, which should descend unchanged to the children of the bearer of it. The termination *s* is sometimes used as equivalent to son, as in Jones, Rodgers. To patronymics belong Norman, Highland, Irish, and Welsh surnames with the prefixes *Fitz*, *Mac*, *O'*, and *Ap*, respectively. In many cases the *Mac* of

Gentile converts, he, along with Barnabas and others, was chosen to go up to Jerusalem, to get the opinion of the apostles and elders there on the question, about 51 A. D. P. and Barnabas now returned to Antioch, where they continued to teach and preach, till a yearning grew up in the heart of the former to revisit his Gentile converts in Asia Minor. In his second expedition, P. was accompanied by Silas instead of Barnabas, and traversed the whole of Asia Minor from south to north, evangelising with great success, after which the two missionaries crossed the Ægean and landed in Europe, planting at Philippi, the capital of Thracian Macedonia, the first Christian church in that continent. The details of his visits to Thessalonica, Berea, Athens, and Corinth are, doubtless, familiar to our readers, and need not be given here. We can only notice his appearance at Athens, where, on Mars' Hill, before a crowd of the citizens, among whom were Epicurean and Stoic philosophers, he delivered that magnificent discourse in which he declared to the Athenians the character of the 'unknown' God. On his return to Asia Minor he visited Ephesus, where, as usual, he 'reasoned' with the Jews in their synagogue; sailed thence to Cæsarea, in Palestine, and proceeded to Jerusalem 'to keep the feast'; after which he again returned to Antioch, the centre from which his operations radiated. Thus closed his second evangelistic journey.—The third journey of P. commenced probably about 54 A. D., and extended over much the same district as the previous one. At Ephesus, where he remained for a period of two years and three months, his efforts were powerfully seconded by the eloquence of the great Alexandrian convert, Apollos. Here it is recorded (Acts, xix.) that 'God wrought special miracles by the hand of Paul, so that from his body were brought unto the sick handkerchiefs or aprons, and the diseases departed from them, and the evil spirits went out of them.' In explanation of this very curious procedure, which has a disagreeable resemblance to ordinary legerdemain, it has been suggested, that as Ephesus was a city noted for its exorcisms, spells, and incantations—the famous *Ephesia Grammatu* sold at a high price to the ignorant and superstitious populace—this style of miracle was an accommodation to their belief in magic and demonism, and intended to shew them, according to their own way of regarding things, the superiority of Christ's power to that of the evil spirits of heathen worship. From Ephesus, P. went up to Jerusalem with a presentiment that heavy evils were about to fall upon him through the ever-maddening malice of the Jews. The Jewish populace were goaded into the wildest fury by the very sight of Paul. The captain of the Roman guard, Claudius Lysias, had to interfere to save him from being torn to pieces; but as forty Pharisees had sworn neither to eat nor drink till they had taken his life, he was sent by night, under a strong escort, to the Roman governor, Felix, at Cæsarea, where he was unjustly detained a prisoner for two years. Having finally appealed to the Roman emperor, according to the privilege of a Roman citizen, he was sent to Rome. On the voyage thither, he suffered shipwreck at Melita (probably Malta), in the spring of 61 A. D. At Rome, he was treated with respect, being allowed to dwell 'for two whole years in his own hired house.' His first thoughts were, as usual, directed towards his Jewish brethren in the city; but, on the whole, he made little impression on them. Whether he ever left the city or not, cannot be positively demonstrated, but it is believed by many critics, from a variety of considerations, that he did obtain his liberty about 64 A. D., and that he made journeys both to the east

and to the west, revisiting Asia Minor, and carrying out his long-cherished wish of preaching the gospel in Spain, then thought to be the western limit of the world. Meanwhile occurred the great and mysterious burning of Rome, generally attributed to Nero. The latter threw the blame on the Christians, who were, in consequence, subjected to a severe persecution. Among the victims was P., who, according to tradition, suffered 67 A. D.—For an account of P.'s correspondence with the churches, see the articles on the different Epistles.

PAUL, the name of five popes, of whom the following appear to call for special notice—PAUL III., whose pontificate falls upon one of the most critical periods in the history of the church, was originally named Alessandro Farnese, and was born at Carino, in Tuscany, in 1468. Having been created cardinal, he served in several important trusts, and eventually became Bishop of Ostia and Dean of the Sacred College. On the death of Clement VII., in 1534, he was elected pope, just at the crisis when the world was alive with expectation of the general council which was to decide all the controversies at that time agitating the public mind of Europe. After some delays, P. convoked the council to meet at Mantua in 1542; but it did not actually assemble (in Trent) until 1545. These delays are by some charged upon P.; but it can hardly be doubted that much of it was due to the difficulties of the times. The bull of excommunication and deposition which he issued in 1538 against Henry VIII. of England, is one of the last examples of the exercise of the temporal power claimed by the medieval popes. In the contest of Charles V. with the Protestant League in Germany, P. sent a large force to support him, and he opposed the pacification proposed by the emperor upon the basis of the *INTERIM* (q. v.). P.'s conduct in aggrandising the fortune of his son, Pietro Luigi Farnese, has been severely criticised by historians; the more so, that this son was born out of wedlock, in the early youth of his father. P. died November 10, 1549, in his 82d year.—PAUL IV., named John Peter Caraffa, a member of the noble family of that name, was born in Naples in 1476. His early career was distinguished for ascetic rigour. He was appointed Bishop of Chieti, in which see he laboured most earnestly for the reformation of abuses, and for the revival of religion and morality. With this view, he established, in conjunction with several congenial reformers, the congregation of secular clergy called *THEATINES* (q. v.), and was himself the first superior. It was under his influence that Paul III. organised the tribunal of the Inquisition in Rome. On the death of Marcellus II. in 1555, although in his seventy-ninth year, he was elected to succeed. He entered upon the wider career of reformation which his new position opened for him with all the ardour of a young man, and with all the stern enthusiasm which had characterised him during life. He enforced vigorously upon the clergy the observance of all the clerical duties, and enacted laws for the maintenance of public morality. He established a censorship, and completed the organisation of the Roman Inquisition; he took measures for the alleviation of the burdens of the poorer classes, and for the better administration of justice, not sparing even his own nephews, whom he banished from Rome, on account of their corrupt conduct and profligate life. His foreign relations, too, involved him in much labour and perplexity. He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, with Cosmo, Grand Duke of Tuscany. Having condemned the principles of the Peace of Augsburg, he protested against its provisions. Under the weight of so many cares, his great age gave way.

guided his actions; and his earliest measures, which were the disgrace of his father's murderers, and the pardon of all Polish prisoners, gave hopes of a good reign; but the capricious violence of character and incapacity for business which P. betrayed, soon disappointed the hopes that he had awakened. No department of the state was free from his frivolous interference, and no class of the nation exempt from the effect of his arbitrary legislation. While he irritated the soldiery by vexatious regulations in regard to their dress, he offended the nobles by imperious enactments as to the ceremonials to be observed in his presence. His foreign policy was marked with similar caprice. After having adopted a system of neutrality in the war between France and the rest of Europe, he suddenly declared in favour of the allied powers, and sent an army of 56,000 men under Suwaroff into Italy. The success of his general encouraged him to send a second army of equal strength to co-operate with the Austrians; but their defeat in 1799 induced P. to recall Suwaroff with the Russian troops; and having retired from the allied coalition without having given any reason for his conduct, he quarrelled with England, because she would not comply with his whimsical demand for the surrender of Malta, and his own recognition as Grand Master of the Order of Malta, and entered into a close alliance with Bonaparte, who was then First Consul. The jealousy and hatred of England by which both were actuated, proved a powerful bond of union between them; and in furtherance of their scheme of uniting all the smaller maritime powers into one vast confederation against England, P. concluded a convention with Sweden and Denmark for the purpose of opposing the right insisted on by England of searching neutral vessels. The result was that the English government sent a fleet into the Baltic under Nelson to dissolve the coalition, at the close of March 1801. P. was preparing to give material aid to the Danes, when a conspiracy was formed at St Petersburg to put a stop to the capricious despotism under which all classes of men in Russia were groaning. The conspirators, whose numbers included Count Pahlen, the most influential man at court, General Beningsen, Uwarow, and many other distinguished nobles and officers, appear originally to have intended only to force P. to abdicate, but his obstinate disposition led to a scuffle, in which the emperor was strangled, March 24, 1801.

PAULDING, JAMES KIRKE, an American author, was born at Pleasant Valley, New York, August 22, 1779. His father was a farmer, descended from the early Dutch settlers. Self-educated, and early developing a tendency to literature, he was a friend of Washington Irving, and wrote a portion of *Salmagundi*. During the war of 1812, he published the *Diverting History of John Bull and Brother Jonathan*; in 1813, a parody of the *Lay of the Last Minstrel*, entitled *A Lay of the Scottish Fiddle*; and in 1814, a more serious work, *The United States and England*, a defence against articles in the *Quarterly Review*. This work attracted to him the attention of President Madison, and caused him to be appointed a member of the Board of Naval Commissioners. In 1817, he published a defence of the southern states and of slavery in *Letters from the South, by a Northern Man*; in 1819, a new series of *Salmagundi*; in 1822, *A Sketch of Old England, by a New England Man*; and in 1824, *John Bull in America, or the New Munchausen*, a satire on the writings of certain British tourists. This was followed by *Königsmarke*, a novel (1825); *Merry Tales of the Three Wise Men of Gotham* (1826); *The New Pilgrim's Progress* (1828); *Tales of a Good Woman* (1829); *Book of St Nicholas* (1830). These

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It is proper, however, to notice that a very different view of the character and doctrines of the P. has been advocated by such modern writers on ecclesiastical history as Gieseler and Neander, according to whom they had their origin from one Constantine of Mananalis (near Samosata), an Armenian, who had received a present of two volumes—one containing the four gospels, and the other the epistles of Paul—and who afterwards assumed the name of Paul, in testimony of his great veneration for that apostle. The distinctive characters of his doctrine and that of his followers were the rejection of the worship of the Virgin, the saints, and the cross, the denial of the material presence of Christ in the Eucharist, and the assertion of a right freely to search the Scriptures; and the charge of Manichæism was falsely brought against them by their persecutors.

PAULL'NIA. See GUARANA BREAD.

PAUL'S (ST) CATHEDRAL in London is noted from its being the largest and most magnificent Protestant church in the world, and second only to St Peter's in Rome among the religious structures of modern times. The site of the present building was occupied about 610 by a Christian church dedicated to St Paul. This church continued till 1083, when it

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PAULINIA. See GUARANA BREAD.

PAUL'S (ST) CATHEDRAL in London is noted from its being the largest and most magnificent Protestant church in the world, and second only to St Peter's in Rome among the religious structures of modern times. The site of the present building was occupied about 610 by a Christian church dedicated to St Paul. This church continued till 1083, when it

was destroyed by fire. From its ruins arose a much more splendid edifice—the immediate precursor of the present cathedral. In 1137, the building suffered severely from fire; but, that being the great age for splendid churches, it was soon restored with great magnificence, the bishops and the people contributing most liberally to defray the cost. Old St Paul's was the largest church in the country, being 690 feet in length, 130 in breadth, and about 150 feet high. The total height of the stone tower and the spire, covered with lead, which surmounted it, was 520 feet. The cloister was 90 feet square, with a beautiful chapter-house in the centre. In 1666, the great fire of London completely destroyed the old cathedral, along with a large portion of the city and most of the churches; and thereafter, Sir Christopher Wren was employed to design about 50 of the new churches, and, among others, the new cathedral. In 1673, he submitted several designs for a new cathedral to the king, who selected one, and ordered a model of it on a large scale to be prepared. This was done by Wren, and the model still exists. Its plan is in the form of a Greek cross, having a large dome over the centre, supported on eight arches. This was, however, eventually departed from; and the new design was modelled on that of a Gothic cathedral, with an interior length of 460 feet, width 240 feet across transepts, and a nave 94 feet wide. The dome, and the eight supporting arches of the model, are preserved; but in the new design the angle arches lead to no spacious compartment, but to small dark passages only: while the upper portions of these great arches are blocked up with other arches, introduced for constructive purposes, but very destructive of the architectural effect. The plan of supporting the dome on eight arches had the charm of novelty, and also of simplicity of construction, but it made the arches themselves too small in proportion to the great span of the dome. The constructive skill displayed by Wren in this building is universally acknowledged and admired, but it is thought that he has allowed the mechanical exigencies of the work to interfere too much with its decorative requirements. The dome, for example, is constructed on a new and most masterly principle, the thrust of the vault being counterbalanced by the weight of a brick cone, which is carried up to support the stone lantern over the exterior dome. But in order to carry this out with the least expenditure possible, the drum, or plain cylindrical wall under the dome, is sloped inwards, so that the columns with which it is decorated appear to the spectator below to be falling inwards, thus producing a painful and disagreeable effect. Great exception is taken to the fact, that the external dome is of wood, and not of stone, and so liable to premature decay; but the same may be said of the wooden roofs over the vaults of Gothic cathedrals; and by making it of wood, Sir Christopher was enabled to raise it to a height which makes it one of the noblest buildings of the kind in the world. The design of the nave, from the classic vaulting with which it is covered, is necessarily to a great extent a failure. When domes, or intersecting vaults, are used in a classic building, the compartments must be about square; there can therefore be but a small number of nave piers, as compared with those of a Gothic cathedral, and the perspective effect of the latter is thus entirely wanting. The same is the case at St Peter's. The dome is particularly successful, and is admitted to be the finest in existence; no other being so graceful and varied in outline and yet so massive in general effect. Its height from the pavement to the top of the cross is 404 feet. The west front, as seen from Ludgate

Hill, is most striking; the two campaniles group most harmoniously with the dome, and, together with the portico, produce a most pleasing and remarkable effect. This front must, however, be condemned, along with the screen-walls, if strictly criticised. The upper portico appears to indicate an upper story where there is none, and the actual construction and true form of the building are not expressed at all. St Paul's is the burial-place of many heroes and men of distinction, whose tombs are in the crypt, and whose monuments adorn the interior of the cathedral. Amongst these are Nelson and Wellington, Collingwood, Abercromby, Moore, Howe, St Vincent, Picton, Rodney, and many other celebrated soldiers and sailors; Howard, Johnson, Reynolds, Barry, Opie, West, Astley Cooper, Sir William Jones, Sir Christopher Wren, and other distinguished civilians. Several of the monuments are by Flaxman, Chantrey, Bacon, and Rossi; but it must be confessed that they savour generally too much of heathen mythology, to be appropriate in a Christian cathedral.

PAULUS ÆGINETA, a celebrated Greek physician, was born in the island of Ægina, and flourished during the conquests of the Calif Omar in the 7th century. Of his life we know almost nothing more than that he pursued his medical studies first at Alexandria, and afterwards in Greece and other countries. His forte lay in surgery and obstetrics, in the latter of which departments of medicine his practice was great. He abridged the works of Galen, and was deeply read in those of Ætius and Oribasius, while he always exercised an independent judgment in forming his conclusions. His descriptions of diseases are brief and succinct, and also complete and exact. He often grounds his explanation of morbid phenomena on Galen's theory of the cardinal humours; while in surgery his writings abound with novel and ingenious views. His works—the principal of which is commonly called *De Re Medica Libri Septem* (Lond. 1834)—have passed through many editions, of which the best is that completed at Lyon in 1567, and they have also had many translators, of whom the best in English is Dr Francis Adams.

PAULUS DIACONUS (also called PAULUS LEVITA, both surnames being derived from his ecclesiastical office), one of the most learned men of his time, and the greatest Lombard historian, was born of a noble Lombard family at Friuli about 730. His father's name was Warnefrid. He received a superior education at Pavia, at the court of the Lombard king Ratchis, and appears to have continued at court during the reigns of his successors, Aistulf and Desiderius, and to have accompanied Adelperga, the daughter of Desiderius, whose education he had conducted, to the court of her husband, Duke Arichis of Beneventum. For her he wrote, in 781, after he had become an ecclesiastic, one of his principal works, his *Historia Romana*, a work of no authority, as it is a mere compilation from works which we possess, but which was greatly used during the whole of the middle ages, as the many manuscripts, recensions, and continuations of it, attest. An edition of the genuine text is still wanting, but a great part of it is given in Muratori's *Rerum Italicarum Scriptores*, vol. 1 (Milan, 1728). In 781, P. became a monk of Monte Casino; but afterwards went to France, and won the esteem of Charlemagne in a high degree by his character and learning. He aided that monarch in his schemes for the promotion of learning, and introduced the study of the Greek language into France. He made a collection of homilies from the best sources, at the emperor's desire, known as the *Homiliarium*, often

printed between 1482 and 1569, and translated into German and Spanish. At the request of Angilram, Bishop of Metz, he also wrote a history of the Bishops of Metz, *Gesta Episcoporum Metensium* (printed in Pertz's *Monumenta Germaniae Historica*, vol. 2), the first work of the kind on the north of the Alps, but the example of which was soon very generally followed. In 787, he returned to his convent, where he remained till his death, which is said to have taken place in 797. In the latter years of his life, he wrote his History of the Longobards (*De Gestis Langobardum*, Libri 6), but did not live to complete it, bringing down the history only to the death of Liutprand in 744. There are several editions of this work, the best of which is contained in the work of Muratori. It is characterised by remarkable candour, and a style unusually pure for that age. The high repute in which this work also was long held, is attested by the great number of manuscripts and continuations. P. was likewise the author of a number of theological works, and of some hymns and letters still extant.

PAULUS, HEINRICH EBERHARD GOTTLOB, a German theologian of great note in his day, and one of the leaders of the Rationalists at the close of the last and the first quarter of the present century, was born at Leonberg, near Stuttgart, 1st September 1761. He gave himself to the study of oriental languages at Göttingen, and afterwards prosecuted it in London and Paris. In 1789, he was called to the professorship of Oriental Languages at Jena, and in 1793 became Professor of Geology, on the death of Döderlein. Here he especially signalled himself by the critical elucidation of the Scriptures of the Old and New Testament, in so far as they presented oriental characteristics. The results of his labours may be seen in his *Philologisch-kritischen und historischen Commentar über das Neue Testament* (4 vols. Lih. 1800—1804); *Clavis über die Psalmen* (Jena, 1791); *Clavis über den Jesaias*, and other writings belonging to this period of his literary activity. In 1803, he removed to Würzburg; in 1808, to Bamberg; in 1809, to Nürnberg; and in 1811, to Ansbach. During these various changes, he had ceased to be a professor, and become a director of ecclesiastical and educational affairs; but in 1811 he accepted the professorship of Exegesis and Ecclesiastical History at Heidelberg. In 1819, he started a kind of historico-political journal entitled *Sophronizon*, in which he continued to write for about ten years. His contributions were marked by weighty sense, moderation, and knowledge of his various subjects, and won him great applause at the time. As a theologian, he is generally looked upon as the type of pure unmitigated rationalism—a man who sat down to examine the Bible with the profound conviction that everything in it represented as supernatural was only natural or fabulous, and that true criticism consisted in endeavouring to prove this. From his numerous writings, we select for mention the following: *Memorabilien* (Leip. 1791—1796); *Sammlung der merkwürdigsten Reisen in den Orient* (7 vols. Jena, 1792—1803); *Leben Jesu, als Grundlage einer reinen Geschichte des Urchristenthums* (2 vols. Heidelb. 1828); *Aufklärende Beiträge zur Dogmen-Kirchen- und Religionsgeschichte* (Bremen, 1830); and *Exegetisches Handbuch über die drei ersten Evangelien* (3 vols. Heidelb. 1830—1833). P. died 10th August 1851, at the advanced age of 90—having lived long enough to see his own rationalistic theory of Scripture give place to the 'mythical' theory of Strauss, and that in its turn to be shaken to its foundations partly by the efforts of the Tübingen school, and partly by those of Neander and the 'Broad Church' divines of Germany. See P.'s *Skizzen aus meiner Bildungs- und Lebensgeschichte*

zum Andenken an mein 50-jähriges Jubiläum (Heidelb. 1839), and Reichlin Meldegg's *H. E., G. Paulus und Seine Zeit* (2 vols. Stuttg. 1853).

PAUPER COLONIES are establishments at Frederiksoord and Veenhuizen in the Netherlands, province of Drenthe, and at Willemsoord and Ommerschans in Overijssel. They were erected by a benevolent society for the purpose of employing poor people in cultivating land and various industries. In 1853, the society suspended payments, and the state took the temporary management, arranged with the creditors, finally retaining Ommerschans and Veenhuizen, leaving Frederiksoord and Willemsoord to be governed by the society.

On 1st January 1860, the government colonies contained 6034 persons, of whom 4407 had been beggars. There were 41 farms, 15 factories and workshops, with churches and schools. The stock consisted of 104 horses, 508 cows, 1259 sheep, &c., and the breadth of land in culture extended to 1454 acres in rye, barley, oats, and buckwheat, 741 in potatoes, and 1124 in grass. Peat is extensively cut; half a million coffee-bags are made annually, &c. These institutions are kept up at a considerable expense to the nation, but have been successful in reducing the numbers and improving the social condition of many of the destitute poor.

The colonies of the benevolent society extend to 4942 acres, and the inhabitants are either tenant cotters, with about 7 acres of land attached to each house, or labour for the society. In 1863, there were 259 cotter families, paying for house, garden, land, and the use of a cow, a yearly rent of about £5, 17s. Those who are not required for the land, work in the factories, weaving cottons, bagging, coarse linens, making baskets, mats, &c. There are two Protestant churches, a Roman Catholic chapel, and a synagogue. The society's colonies have never been self-supporting, and are partly maintained by the yearly contributions of members, gifts, legacies, &c.; the total receipts, from all sources, in 1862, amounting to £37,000, and the expenditure to £34,000. Pop. 2611. In 1863, there were 5079 members who contributed £1378; and the property, stock, &c., of the society are valued at £74,000. The colonists have been greatly improved in position, and their houses shew signs of industry and comfort. When working in the factories, a tenth part of their weekly earnings is placed in a reserve fund, which is paid out to them in winter or in time of sickness.

PAUSA'NIAS, a famous Spartan regent and general, the son of Cleombrotus, and nephew of Leonidas. He commanded the confederate Greeks in the important battle of Plataea (479 B.C.), in which the Persians were totally routed, and their leader, Mardonius, slain. He then marched his troops against Thebes, and compelled the inhabitants to give up the chiefs of the Persian party to him for punishment. Elated by this victory, however, he became in an extreme degree haughty and vain-glorious, took all the credit to himself, and allowed none to the Athenian generals, Aristides and Kimon, who commanded under him, and treated all the other Greeks as if the Spartans were their lords. Nevertheless, he still continued his conquests, capturing Cyprus and Byzantium. It was here he first began to play false to Greece. He entered into secret negotiations with Xerxes, with the view of becoming ruler, under the Persian monarch, of the whole country, and in his journey through Thrace, even adopted the dress and luxurious habits of a Persian satrap, and surrounded himself with a body-guard of Persians and Egyptians. Being recalled, on account of these things, by the Spartans, his former

services procured his acquittal. He then returned to Byzantium, where he renewed his traitorous intrigues, was expelled from the city for a criminal assault upon a Byzantine lady, withdrew to the Troad, and there continued his treachery. He was a second time called to account by the Spartan elders, but again escaped, though with greater difficulty. Yet his passion for the sovereignty of Greece, even though at the expense of the national liberties, once more drove him to play the traitor. He tried to stir up the Helots, but was taken in his own net. A Helot betrayed him. When P. found his position desperate, he took refuge in a temple of Athena. Hereupon the people blocked up the gate of the temple with heaps of stones, and left him to die of hunger, his own mother depositing the first stone.

PAUSANIAS, one of the most eminent of Greek geographers and historians, was probably a native of Lydia in Asia Minor, and was born some time in the 2d century. He travelled through almost all Greece, Macedonia, and Italy, and also through part of Asia and Africa, and composed from his observations and researches an Itinerary, entitled *Huados Periegesis*, in ten books, describing the different parts of Greece, and giving a particular account of the monuments of art and of the legends connected with them. His style is by no means pure; but in matters of his own observation he is most trustworthy, and his work is, on many subjects, one of the most valuable sources of information that we possess. There are numerous editions of his work; the oldest was printed at Venice in 1516 by Aldus; and the most recent is that by J. H. C. Schubart and C. Walz (3 vols. Lep. 1838—1840). Translations of P. exist in English, German, and French.

PAVEMENT, flat stones or 'flags' used for the paving of halls, kitchens, and other apartments, and frequently for footpaths; also the stone covering of the roadway of streets. The stones used for flags vary in different districts, according to the geological formation of the neighbourhood. The pavements now most commonly used in England and Scotland are the Arbroath and Caithness stones—the former a softer and more agreeable stone than the latter, which is exceedingly hard and slippery when wet. Pavement should be carefully laid on a solid dry foundation, and set in a good bed of concrete or mortar, and the joints pointed with cement. It may also be laid on small dwarf walls, built of brick, or on supports all the edges—this is a good method for keeping the floor dry.

The PAVING OF STREETS is of early date, and is, in fact, necessary to any considerable degree of civilisation and traffic. The Romans paved their streets in the same elaborate and solid manner in which they paved their highways. See ROADS. Portions of the ancient pavement of the streets of Rome are in use to the present day, and the pavement of Pompeii remains entire. It is laid with large blocks of stone of polygonal shape (like Cyclopean masonry), very carefully fitted together, and of considerable depth, and below there is a carefully prepared basis, often composed of several distinct strata. Some of the Italian towns—Florence, for instance—have still pavement of this description, and no foot-pavement.

The mediæval cities were almost all unpaved till about the 12th c., when the main streets of the chief towns began to be protected with stone. The plan now adopted is nearly the same in all the cities of Europe. The first thing to be done is to secure or make a solid foundation. This is done, where the natural substratum is not of a solid kind,

by laying the street with a solid bed of concrete, having a slope from the middle to the sides to throw off the water. On the concrete is placed the real pavement, which is composed of blocks of granite, trap, or other tough rock. These should be rectangular, and the deeper the better. They are generally about 10 inches to 12 inches in depth, and 6 inches or 7 inches broad, and from 1 to 2 feet in length. They should be all bedded and jointed in strong mortar. This is not often done, as it is thought sufficient to bed the stones in sand, and grout them with hot lime on the top. It is clear, however, that the more equal the stones are in depth, and the more solidly they are bedded, the longer they will last. Other materials besides stone have been tried for the paving of streets—such as blocks of wood with the end up, and blocks of cast iron. The wooden pavement is delightfully easy, and not noisy, but in wet weather it is exceedingly slippery. Cast-iron is too hard, and causes too much jolting and noise.

The great obstacle in the way of really good pavement in modern streets is the necessity of frequently breaking it up for the laying and repairing of pipes for gas, water, &c. The true remedy—and, in the end, the cheapest—would be to have, in the chief streets at least, sub-ways or tunnels for drains and pipes, accessible without breaking up the pavement.

PAVIA, a city of Northern Italy, capital of the province of the same name, on the left bank of the Ticino, 20 miles south of Milan, and 3 miles above the confluence of the Ticino and the Po. A covered bridge of eight arches connects the city with the suburb of *Borgo Ticino*, on the right bank of the river, and from this bridge the *Strada Nuova*, or *Corso*, the principal thoroughfare, leads north, and extends to the outskirts. The city is large, surrounded by walls, and has an imposing appearance, bearing the impress of antiquity. In former times, it was called the 'city of a hundred towers'; but the palace of Theodoric, and the tower where Boëthius wrote the treatise *De Consolatione Philosophiæ*, no longer exist; among the remaining ones are those of Belcredi and Del Maino, which are each 169 feet high. Its oldest church, and perhaps the oldest in Italy, is that of San Michele, which, although the date of its foundation is uncertain, is first mentioned in 661. The cathedral, containing some good paintings, was commenced in 1484, but was never finished. In a beautiful chapel attached to it, are the ashes of St Augustine, in a sarcophagus ornamented with 50 bassi-relievi, 95 statues, and numerous grotesques. In the Church of San Pietro in Ciel d'Auro are deposited the remains of the unfortunate Boëthius. The Certosa of P., the most splendid monastery in the world, lies four miles north of the city. It was founded in 1396, contains many beautiful paintings, and abounds in the richest ornamentation. It has an octagonal cupola, painted ultramarine, and enamelled in gold. It was sacked by the French in 1796. Its church is in the form of a Latin cross, and is 249 feet long, and 173 feet wide. The university of P. is said to have been founded by Charlemagne in 774, and was one of the most famous seats of learning during the middle ages. Its efficiency was much increased by Galeazzo Visconti, who bestowed many privileges upon it in the year 1396. It consists of numerous colleges, and attached to it are a library of 120,000 vols., a numismatic collection, anatomical, natural history, and other museums, a botanic garden, a school of the fine arts, &c. The university is attended by about 1600 students. It has numbered among its professors Alciati, Fidele, Spallanzani, Volta, Scarpa, Foscolo, and Monti.

The other chief edifices comprise private palaces, theatre, gymnasium, &c. P. carries on a good trade in wine, rice, silk, and cheese. Pop. (1862) 30,480.

P., the ancient *Ticinum* (afterwards *Papia*, whence the modern name), was founded by the Ligurii; it was sacked by Brennus and by Hannibal, burned by the Huns, conquered by the Romans, and became a place of considerable importance, at the end of the Roman empire. Then it came into the possession of the Goths and Lombards, and the kings of the latter made it the capital of the kingdom of Italy. It became independent in the 12th c., then, weakened by civil wars, it was conquered by Matthew Visconti in 1345. Since that period, its history is merged in that of the conquerors of Lombardy. Here, in 1525, the French were defeated by the imperialists, and their king taken prisoner; but in 1527, and again in the following year, it was taken and laid waste by the French. It was stormed and pillaged by Napoleon in 1796, and came into the possession of Austria by the peace of 1814. Since 1859, it has been included within the re-organised kingdom of Italy.

PAVIA. See HORSE-CHESTNUT.

PAVILION, a portion of a building, under one roof, of a tent-like form, with the slope of the roof either straight or curved. This form is much used in France—the higher parts of the new buildings at the Louvre are good examples of pavilions. Pavilion roofs are sometimes called French roofs.

PAVLOGRA'D, a town of South Russia, in the government of Ekaterinoslav, and 38 miles east-north-east of the town of that name, on the Voltcha, an affluent of the Dnieper. It was founded in 1780, during the reign of the Empress Catharine II., and its first colonists were the Zaporogsky Cossacks. But in 1782, a great portion of the English garrison of Fort Magon in Minorca, having been subdued by the Spaniards, and being forced by the terms of their capitulation to renounce the English service, obtained liberty from the Empress Catharine to settle in Pavlograd. The garrison was composed chiefly of Corsicans. Pop. of the town (1864), 9309.

PAVONIDÆ, a name sometimes used by ornithologists to designate the family of gallinaceous birds more commonly called *Phasianidæ* (q. v.), sometimes applied as a designation to a portion of that family separated from the rest on very slight grounds, the chief distinction being the greater expansion of the tail. See PEACOCK and POLYPLECTRON.

PAWL, on shipboard, is a catch or hook to prevent the capstan from flying round backwards during a pause in the heaving. A similar catch is used in the common windlass.

PAWNBROKING (Du. *pand*, Ger. *pfand*, Fr. *pan*, a pledge). The business of lending money on pawns or pledges appears to have been carried on in England by certain Italian merchants or bankers as early at least as the reign of Richard I. By the 12th of Edward I., a message was confirmed to these traders where Lombard Street now exists; the name being, according to Stow, derived from the Longobards who used to congregate there for business purposes. Subsequently, these merchant adventurers became known generally by the name of Lombardens. Their wealth became proverbial. Among the richest of them were the celebrated family of the Medici; from whose armorial bearings it is conjectured that the pawnbroking insignia of the three balls have been derived. The bankers of Lombard Street appear to have exercised a monopoly in pawnbroking until the reign of Elizabeth. The trade is first recognised in law by the act 1st

James I. c. 21. In the perilous days of Charles I. the goldsmiths were very frequently chosen as the custodiers of plate and money; which circumstance seems to have suggested to them the profitable business of lending on pawns and discounting bills. From this time, the oppression and extortion often exercised by brokers has continued to attract much public attention and discussion; and an effort has been made, both in England and on the continent, to obviate the evil by the establishment of what are called *Monts de Piété*, the object of which is to advance small sums to the very poor at a moderate interest. See MONT DE PIÉTÉ. In England, after many abortive efforts, a *Mont de Piété* office was started in 1708; but in 1731 it came to a disastrous end. The bubble mania of 1824—1825 gave rise to a similar scheme. In this instance upwards of £400,000 was subscribed; but the undertaking miscarried, and the capital was lost. A similar fate attended the Irish *Monts de Piété*, of which there were eight in 1841. In 1848, they had all disappeared except one, which lingered to 1853; when it also expired. It would thus seem hopeless to attempt to establish a pawnbroking office in England on any other footing than an ordinary commercial one. The cause of failure will be found to lie, generally, in the great difficulty of conducting a commercial undertaking on charitable principles, with sufficient energy and ability to compete successfully with others originating in the ordinary motives which lead men to engage in trade.

It hardly admits of dispute that the pawn-shop, in its practical working, is an evil—necessary, it may be, but still an evil; and the having recourse to it is strongly to be discouraged. There are, doubtless, cases where men are driven to pawn their goods from causes which are not discreditable, and which do not render it certain that they are on the road to ruin; but such cases are rare exceptions to the general rule. Besides making borrowing too easy, and thus encouraging the fatal habit of anticipating income, the pawn shop is, in nine cases out of ten, the door to the drinking-shop. Even where the one does not directly lead to the other, it generally does so in the end. That 'borrowing dulls the edge of husbandry' applies with a force increasing in a geometrical ratio as we descend in the scale of society. Admitting, however, that with all its tendency to demoralise, pawnbroking is, in many cases, of value in tiding over unforeseen pecuniary difficulties, it is sufficient to say, that so long as improvidence prevails among large classes of society, and so long as even the most prudent are liable to unforeseen accidents, the accommodation of the pawn-shop is to a certain extent a necessity, and like other demands of the public will continue to be supplied. Nor are those who supply this demand to blame, any more than the caterers for many other expenses which economists pronounce to be wasteful. The fault, where there is a fault, is in those who borrow, not in those who lend. The legislature, accordingly, instead of trying to put down pawnbroking, has wisely confined itself to putting it under stringent regulations so as to prevent as far as possible its abuse.

Pawnbrokers are restricted in their business by various acts of parliament, some of which were passed before the recent abolition of the Usury Acts. The chief statute is the 39 and 40 Geo. III. c. 99, which requires them to take out a licence (for which they pay £7, 10s., and if they deal in silver-plate, £5, 15s. additional), fixes the rate of interest, and makes it necessary that a table of interest should be put up in a conspicuous part of the shop, to keep books with correct entries of the name and place of abode of the owners

splendid Palace at Sydenham, the construction of which he superintended, the grounds were also laid out by him. Crystal palaces for exhibitions of artistic and industrial objects have since 1851 been constructed at Dublin, New York, Paris, Manchester, &c. In 1854, P. was returned to parliament on the liberal interest for Coventry, which he still (1864) continues to represent. He is a member of many learned societies in Europe, and his works on horticulture and botany are much esteemed.

PAYMASTER-GENERAL is an officer of the British ministry, but not of the cabinet, charged with superintending the issue of all moneys voted by parliament. He is virtually the paymaster of the public service, having no control over the sums issued, and paying merely on the order of the department concerned. The salary of the office is £2000 per annum. The paymaster-general is always either a peer or a member of the House of Commons, and of course changes with the ministry. Of late years the office has been held in conjunction with that of Vice-president of the Board of Trade. The paymaster-general is assisted by a deputy and a staff of clerks, the annual cost of the whole department amounting to £21,500. The first notice of this office is in the early part of the reign of Charles II., when the paymaster-general was nothing more than the sole paymaster of the army. The present extensive duties of the office have been added by degrees during the 19th century.

PAYMASTER, MILITARY AND NAVAL.—Military paymasters are either 'District' or 'Regimental.' Of the latter, who constitute by far the more numerous class, there is one to every brigade of artillery, regiment of cavalry, and battalion of infantry. The paymaster holds no other commission, but the appointment is nearly always conferred upon some person who has previously held a combatant rank in the army. The functions of paymaster comprise issuing and accounting for the pay of officers and men, and having charge generally of all the finances of the corps. In discipline, the paymaster is responsible to the officer commanding the regiment; but in all money matters he looks for orders to the War Office alone. He commences with a pay of 12s. 6d. a day, with the relative rank of captain; and after twenty years' service attains the pay of £1, 2s. 6d. a day and relative rank as major. Regimental paymasters were first appointed during the French war.

District paymasters have financial charge in recruiting districts. They are usually old officers, and receive each 2s. 6d. a day more than the rates of regimental pay. Both in districts and regiments army paymasters have to provide security for the faithful discharge of their duty.—The **NAVAL PAYMASTER** is for a ship what the military paymaster is for a regiment; but he adds to those duties some of those performed in the army by the quartermaster, commissariat, and military storekeeper, for he has charge of the provisions, clothing, and miscellaneous stores, as well as of mere money. Paymasters are commissioned officers, receiving from £1, 12s. 11d. to 13s. 8d. a day, and ranking, according to service, with captains, commanders, and lieutenants. Up to the year 1844 paymasters were styled pursers, and were paid by profits they made on certain of the ship's charges. At a still earlier period these pursers had been warrant-officers.

PAYMASTER-SERGEANT, in the army, is a non-commissioned officer, whose duty it is to act as clerk to the paymaster. He ranks with other staff-sergeants, and receives from 2s. to 3s. a day, according to his corps, with an increase of 6d. after

seven years' uninterrupted service as paymaster-sergeant.

PAYNISING, a process for preserving and hardening wood, invented by a Mr Payne. It consists in placing well-seasoned timber in an air-tight chamber, and then, when, by means of a powerful air-pump, the wood is deprived of its air, a solution of *sulphuret of calcium*, or of sulphuret of barium is admitted, and readily fills up the empty vessels all through the wood. The air-pump is again used, and the superfluous moisture is drawn out, and a solution of sulphate of iron is injected; this acts chemically upon the sulphuret of barium or of calcium, and forms all through the wood either the insoluble sulphate of barium (heavy spar) or of lime (cypsum). The addition of these mineral materials renders the wood very heavy, but it becomes also very durable, and almost incombustible.

PEA (*Pisum*), a genus of plants of the natural order *Leguminosae*, suborder *Papilionaceae*, closely allied to the genus *Lathyrus* (q. v.), from which it differs chiefly in the triangular style. Two species, supposed to be natives of the south of Europe and of the East, are very extensively cultivated for their seeds (peas), which are the best of all kinds of pulse; the **COMMON PEA** or **GARDEN PEA** (*P. sativum*) in gardens, and the **FIELD PEA** (*P. arvense*) in fields; both of them climbing annuals, with pinnate leaves, ovate leaflets, and branching tendrils in place of a terminal leaflet; the **Garden Pea** distinguished by having two or several flowers on each flower-stalk, the flowers either red or white, more generally white, and the seeds subglobular; the **Field Pea** having one flower on each flower-stalk, the flowers always red, and the seeds angular from crowding and compression in the pod. But it is not improbable that they are truly one species, of which the **Garden Pea** has, through cultivation, departed furthest from the original type. Peas have been cultivated in the East from time immemorial, although the ancient Greeks and Romans do not seem to have been acquainted with this kind of pulse, the cultivation of which was apparently introduced into Europe very early in the middle ages; and its cultivation extends from warm climates, as India, even to the Arctic regions, the plant being of rapid growth and short life. The seeds of the **Garden Pea** are used for culinary purposes both in a green and in a ripe state; also the green enucleated pods of some varieties, known as **Sugar Peas** or **Wyker Peas**, in which the membrane lining the inside of the pod—parchment-like in most kinds—is much attenuated. **Field peas** are used both for feeding cattle and for human food. For the latter purpose, peas are often prepared by being *shelled*, or deprived of the membrane which covers them, in a particular kind of mill; they are then sold as *Split Peas*, and are much in use for making *Pea Soup*. They are also ground into meal, which is used in various ways, chiefly for making a kind of pottage and of unleavened bread. In the countries bordering on the Mediterranean, peas are roasted in order to eating.

There are innumerable varieties both of the **Field Pea** and the **Garden Pea**, those of the latter being so much the products of horticultural art, that they cannot be preserved without the utmost attention. Some of the kinds of garden peas have long stems, and require for their support stakes of six or eight feet in height; others are of humbler growth; and certain dwarf kinds, preferred as most convenient in many gardens, succeed very well without stakes. The largest kinds are sown in rows about four feet asunder. In Britain, garden peas are sown at different times from February to June, in order to

London, which is now being expended in building improved dwellings for the working-classes.

PEACE, ARTICLES OF THE, in English Law, are certain complaints made against a person who threatens another with bodily injury, and the redress given is to bind the threatening party over with sureties to keep the peace. All justices of the peace have, by their commission, authority to cause persons to find sufficient security to keep the peace, and an ancient statute also gives authority. Hence any one who is threatened either in person or property, or in the person of his wife or child, may go before a justice of the peace and complain on his oath of the fact. The justice is to consider if the language used amounted to a threat, and if he is satisfied that it does, he issues his warrant to bring the party before him, who is then heard in explanation, and if it is not satisfactory, he is ordered to find sureties. If he cannot do so, he is committed to prison for a limited time, or until the next quarter-sessions. The party, when he finds sureties, is bound over for a term not exceeding twelve months. If he has entered into recognizances (i.e., given a bond with sureties), and he break the peace, he forfeits his recognizance, and the sureties' goods can be seized to pay the amount of the bond.

PEACE, OFFENCES AGAINST THE PUBLIC, are those offences which consist in either actually breaking the peace, or constructively doing so by leading directly to a breach. These offences are now usually known under the heads of unlawful assemblies, seditious libels and slanders, riots, affrays, challenges to fight, forcible entry and detainer, and libel and slander. Those who take part in an unlawful assembly commit a misdemeanour against the public safety. All persons assembled to sow sedition, and bring into contempt the constitution, are in an unlawful assembly. Thus it was held that an attempt to hold a national convention was illegal, for it was impossible to anticipate with certainty the peaceable result of such a meeting. It is, however, somewhat difficult to define precisely what amounts to an illegal assembly, except by saying that it points to some course inconsistent with the orderly administration of the laws. It is the duty of all individual citizens to resist and oppose any unlawful assembly; but the duty rests primarily with the magistrates of the district, who are indictable for breach of duty in not taking active and immediate steps to put down riots. Thus the mayor of Bristol was indicted for not suppressing the riots at the time of the Reform Bill. The magistrates ought to call at once upon special constables to be sworn in, and if these are insufficient, to call for the aid of the military. Seditious libels are also offences against the peace, as inciting directly to a breach. Such are libels vilifying the Sovereign or the Houses of Parliament, or the courts of justice, or even a foreign sovereign, as in the case of Peltier, who was tried for a libel against the Emperor Napoleon I., the tendency of such a libel being to breed misunderstanding between our own sovereign and the foreign sovereign. A riot is the most active form of an offence against the public peace. To constitute a riot, there must be at least three persons engaged together in pursuance of an illegal purpose. Riots often originate in an attempt to redress summarily some private wrong. On such an occasion, before extreme measures are resorted to, and as a test of the good faith of those who are spectators, instead of parties, and by way of full notice to all concerned, the justices of the peace may read the Riot Act, 1 Geo. I. st. 2, c. 5, which commands all persons to disperse within one hour after a proclamation is read, otherwise they will be

guilty of felony. Persons not removing within one hour thereafter may be arrested, and carried before a justice, and committed to prison. It is, however, possible that the justices may make a mistake in thinking that to be an illegal assembly which is not so, for the mere reading of the Riot Act does not alter the character of the assembly, and accordingly if the party arrested prove at the trial that it was no illegal assembly he will be discharged. An affray is also an offence against the public peace, being a public assault, i.e., an assault committed in presence of third parties, for this is apt to lead to further breaches of the peace by others joining in it. Thus prize-fights and duels are affrays, and all present at them are principal offenders, and may be arrested by a constable and bound over to keep the peace, and punished by fine and imprisonment besides. So challenges to fight, provocations to fight, and forcibly entering into a house, are misdemeanours against the public peace.

PEACH (*Amygdalus Persica*), a tree much cultivated in temperate climates for its fruit; a native of Persia and the north of India; of the same genus with the ALMOND (q.v.), and distinguished by oblongo-lanceolate serrulate leaves; solitary flowers, of a delicate pink colour, appearing before the leaves; and the sarcocarp of the drupe succulent and tender, not fibrous as in the almond. This difference in the drupe has been made by some the ground of a generic distinction, but there are intermediate states, so that others have doubted if the P. and almond are even specifically distinct. The NECTARINE differs from the P. only in having a smooth fruit, whilst that of the P. is downy or velvety, and is a mere variety, probably produced and certainly preserved by cultivation. Both peaches and nectarines are divided into *freestones* and *clingstones*. In the former the flesh of the fruit parts from the stone; in the latter it adheres to it. The Freestone P. is the *Pêche* of the French, the Clingstone P. their *Pavie*; the Freestone Nectarine they call *Pêche lisse*, and the Clingstone Nectarine *Bruynon*. Of all these there are many sub-varieties, the finer ones being perpetuated by budding, which in Britain is generally on plum or almond stocks. There is a remarkable variety of Chinese origin, with the fruit compressed and flattened, and with almost evergreen leaves. The P. is much cultivated in the south of Europe, in many parts of the East, in the warmer temperate parts of North and South America, in Australia, &c., as a standard tree; in general, it is rather a small tree with a full head; in Britain, it is generally trained on walls, and in the northern parts of it on flued walls or in bot-houses, although even in Scotland excellent peaches are ripened on open walls without artificial heat. The Nectarine is rather more tender than the peach. In the extensive P. orchards of New Jersey, Pennsylvania, Maryland, and other states of North America, which sometimes contain 10,000 or 20,000 trees, the fruit is often of very inferior quality, from want of care in cultivation—the orchards being planted by simply depositing the seed in the ground; and much of the fruit is used for making a spirituous liquor called *Peach Brandy*; much of it is dried in ovens, or in drying-houses furnished with stoves, or, in the more southern states, in the sun, each fruit being divided into two parts, and the stone taken out, and when dried it is sent to market to be used for pies; the refuse of the orchards is used for feeding swine.—The P. is a very pleasant and refreshing fruit, and in a stewed form is useful in slight cases of constipation. The leaves, when fresh, have the smell and taste of bitter almonds; and by bruising them, mixing the pulp with water, and distilling, the *Peach Water* is

eyes are yellow; the neck, and other fore parts, greenish with golden reflections. The crest is longer than that of the Common P., its feathers less equal, and webbed along their whole length.

PEACOCK-STONE, the name under which the dry cartilaginous ligaments of some large lamellibranchiate molluscs, as the pearl oyster, are sold by jewellers. They are used for ornamental purposes, although not so much as formerly; and far more on the continent of Europe, particularly in Portugal, than in Britain. They have opaline reflections, and are therefore sometimes called *Black Opal*.

PEA CRAB (*Pinnotheres*), a genus of brachyurous crustaceans, with nearly circular and not very hard carapace. They are of small size, and interesting from their living within the mantle-lobes of lamellibranchiate molluscs, a circumstance which was well known to the ancients, and gave rise to many curious fables. A species (*P. verrum*) is very common in the pinnas of the Mediterranean, and was imagined to render important services to its host in return for its lodging, keeping a lookout for approaching dangers, against which the blind pinna itself could not guard, and particularly apprising it, that it might close its shell when the cuttle-fish came near. It is curious to find this repeated by Hasselquist, in the middle of last century, as a piece of genuine natural history. Whether the P. C. lives at the expense of the mollusc, and sucks its juices, is uncertain. It is certain that the flesh of such molluscs is palatable to pea crabs, and they eat it greedily in the aquarium. The friendship of the P. C. and the pinna is of course as fabulous as that of the lun and jackal, or of the rattlesnake, the owl, and the prairie-dog. A species of P. C. (*P. pisum*) is very common within the mantle-lobes of the Common Mussel on the British coast. Species are found in almost all parts of the world.

PEA MAGGOT, the caterpillar of a small moth (*Tortrix* or *Grapholitha pisii*), which lays its eggs in young pods of peas. The caterpillar lives in the pods, and eats the peas. This moth is very common in Britain, and in wet seasons the pods of peas are often found very full of its caterpillar.

PEAN (Old Fr. *pannea*, furs), one of the furs borne in Heraldry, differing from Ermine only in the tinctures: the ground being sable, and the spots of gold.

PEA ORE, a form of compact brown iron ore (hydrated peroxide of iron), consisting of round smooth grains, from the size of mustard-seed to that of small pease. Sometimes the grains are still smaller and flattish. This iron ore is very abundant in some places in France, and is smelted.

Peas.

PEAS. This iron ore is very abundant in some places in France, and is smelted.

PEAR (*Pyrus communis*), a tree of the same genus with the Apple (see *PYRUS*), and like it one of the most extensively cultivated and valuable fruit trees of temperate climates. The leaves are ovate, serrated, smooth on both surfaces, and without glands; the flowers are produced in corymbs, which may almost be called umbels, and are smaller than those of the apple; the styles are distinct and not combined at the base, as in the apple, and the fruit is hemispherical at one end, tapering gradually away, more or less rapidly, to a point at the other. The pear-tree grows wild in woods and copes in Britain, on the continent of Europe, and throughout the temperate parts of Asia. In its

wild state it is usually either a large shrub or a small tree, thorny, and with small austere fruit. In cultivation it is without thorns, becomes a tree of 40 or 50 feet high, sometimes more; and its stem attains a diameter of three feet. Cultivation has wrought even greater changes in the size and quality of its fruit. The pear has been cultivated in a remote antiquity. Its cultivation was probably introduced into Britain by the Romans. The cultivated varieties are extremely numerous; and many new ones of great excellence have recently been produced. The *Jargonelle Pear* may be mentioned as one of the most esteemed of the varieties long known in Britain. Some of the kinds called *Parmentier* and *Beurré* are highly esteemed. Many new kinds have recently been introduced into Britain from France and Belgium. The varieties of pear differ much in hardness and in fitness for particular soils; although a deep, moderately strong, deep, loamy soil is the best for this fruit. The best varieties are cultivated in Britain as wall-trees. Pears succeed well as espaliers. They are generally grafted on seedling stocks of the wild pear, but sometimes on the rowan, and sometimes on the quince. Pears grafted on quince stocks are the best for shallow soils. The flowers and fruit of the pear are mostly produced on spurs, which sprout from branches of more than one year old. Various modes of training and pruning are practised for pear-trees. Among the varieties of pears are some which ripen early in autumn, and some which do not ripen till the beginning of winter, and which even require to be mellowed by keeping for a short time; whilst some of the kinds cannot easily be kept for more than a few days. In general pears cannot be kept so long nor so easily as apples. Pears are sometimes made into a preserve with syrup; and sometimes cut into pieces, and dried in the sun or in an oven, to be afterwards used in jam, a practice very prevalent in France.—A very agreeable fermented liquor called *Perry* is made from pears, in the same manner as Cider from apples, and pear orchards for this purpose are to be seen in some parts of England, especially in Wiltshire and Herefordshire. The varieties of pear cultivated for making perry are all rather austere, and those which yield the best perry are far too austere to be palatable.—The wood of the pear tree is reddish, very hard, fine-grained, and valuable to turners and joiners. It is often dyed black as imitation of ebony, which it then greatly resembles.

Besides the varieties of pear usually referred to *Pyrus communis*, some are occasionally cultivated which are generally regarded as distinct species. Such are the **AURELIAN PEAR** (*P. salicifolia*), a native of France, with leaves much narrower than the common pear, and a long fruit, which is used for making perry; the **SNOWY PEAR** (*P. nivalis*), a native of the Alps of Austria, with oval leaves, white and silky beneath, and a globose fruit, which is very acid till it becomes quite ripe, or beginning to decay, when it is very sweet. The **SAND PEAR** (*P. sinensis*), a native of China and Cochinchina, with heart-shaped, shining, almost evergreen leaves, and apple-shaped warted fruit, very gritty, and fit only for baking, cultivated in gardens in India, but hardly in Britain. The **PASHA** (*P. pashia* or *P. variolosa*) is a native of the Himalaya; the fruit of which is only edible when blighted or partially decayed. The **PALNIA** (*P. lanata*) is another Himalayan species with edible fruit. Both are quite hardy in Britain.

PEAR, PRICKLY. See **PRICKLY PEAR**.

PEARL, a peculiar product of certain marine and fresh-water molluscs or shell-fish. Most of the

the fishery frightening away those dreaded creatures. The divers are sometimes paid fixed wages, others agree for one-fourth of the produce. When a boat-load of oysters has been obtained, it returns to shore, and the cargo, sometimes amounting to 20,000 or 30,000, is landed and piled on the shore to die and putrefy, in order that the pearls may be easily found. The heaps are formed in small walled compartments, the walls surrounding each being about one or two feet in height. Several of these compartments surround a small central enclosure, in which is a bath, and they slope towards this bath, and are each connected with it by a small channel, so that any pearls washed out from the putrefying mass by the rain may be carried into the bath. When the animals in the shells are sufficiently decomposed, the washing commences, and great care is taken to watch for the loose pearls, which are always by far the most valuable; the shells are then examined, and if any attached pearls are seen, they are handed over to the clippers, who, with pinchers or hammer, skilfully remove them. Such pearls are used only for setting; whilst the former, being usually quite round, are drilled and strung, and can be used for beads, &c. The workmen who are employed to drill the pearls also round the irregular ones, and polish them with great skill. The method of holding the pearls during these operations is very curious; they make a number of holes of small depth in a piece of dry wood, and into these they fit the pearls, so that they are only partly below the surface of the wood, which they then place in water. As it soaks up the water and swells, the pearls become tightly fixed, and are then perforated, &c. These operations are all carried on at the spot.

For many miles along the Condatchy shore, the accumulation of shells is enormous, and averages at least four feet in thickness. This is not to be wondered at, when it is remembered that this fishery has been in active operation for at least 2000 years. The place itself is exceedingly barren and dreary, and, except during the fishing season, is almost deserted; but at that time it presents an exceedingly animated spectacle; thousands of people, of various countries and castes, are here drawn together—some for the fishery, others to buy pearls, and others to feed the multitude. They chiefly reside in tents, so that it appears a vast encampment.

The pearls vary much in size; those as large as a pea, and of good colour and form, are the best, except unusually large specimens, which rarely occur, the most extraordinary one known being the pearl owned by the late Mr Hope, which measured two inches in length, and four in circumference, and weighed 1800 grains. The smaller ones are sorted into sizes, the very smallest being called seed-pearls. A considerable quantity of these last are sent to China, where they are said to be calcined, and used in Chinese pharmacy. Amongst the Romans, the pearl was a great favourite, and enormous prices were paid for fine ones. One author gives the value of a string of pearls at 1,000,000 sesterces, or about £8000 sterling. The single pearl which Cleopatra is said to have dissolved and swallowed was valued at £80,729; and one of the same value was cut into two pieces for earrings for the statue of Venus in the Pantheon at Rome. Coming down to later times, we read of a pearl, in Queen Elizabeth's reign, belonging to Sir Thomas Gresham, which was valued at £15,000, and which he is said to have treated after the fashion of Cleopatra; for he powdered it and drank it in a glass of wine to the health of the Queen, in order to astonish the ambassador of Spain, with whom he had laid a wager that he would give a more costly dinner than could the Spaniard.

During the occupation of Britain by the Romans this country became famous for its pearls, which were found in the freshwater mussel of our rivers. See FRESHWATER MUSSEL. Generally the pearls of this mollusc are small, badly coloured, and often valueless; but occasionally they occur of such beauty as to rival those of the pearl oyster. At present, in the Scotch rivers, the search for pearls is prosecuted vigorously and successfully, especially by a merchant, named Unger, of Edinburgh, who has brought Scotch pearls into great repute. He has collected specimens ranging from £5 to £90 each, and formed a necklace worth £350. In Scotch pearls of the highest quality, there is a pleasing pinkish tint, which is very permanent. The fishing for pearl mussels is by no means so dangerous or troublesome as for pearl oysters; usually they are found in the beds of streams, shallow enough to wade in, and so clear that they can be seen at the bottom. If too deep to remove with the hand, they are easily captured by putting a stick between their gaping shells, which instantly close upon it, and can be drawn out with it. So profitable is this pursuit becoming, that a great many persons are now engaged in it.

Very fine river pearls, known on the continent as Bohemian pearls, are found in the rivers Moldau and Wottawa. There is also a fresh-water pearl fishery in Bavaria, where the river Ilts yields at times very fine specimens. Even the most inferior pearls have a market value; for pearls can only be properly polished with pearl dust, and the inferior pearls are powdered for the purpose of polishing and rounding the finer ones.

False pearls are very admirable imitations, made by blowing very thin beads or bulbs of glass, and pouring into them a mixture of liquid ammonia, and the white matter from the scales of the Bleak, and sometimes of the Roach, and Dace. The proper way to prepare the pearl-matter is first to remove the scales of the lower part of the fish; these must then be very carefully washed, after which they are put to soak in water; when the pearly film falls off and forms a sediment at the bottom of the vessel, which is removed and placed in liquid ammonia for future use. This pearl mixture, when of the best quality, is very costly, being as much as £4 or £5 per ounce. For use, it is diluted with ammonia, and injected into the glass beads, so as to thinly coat them inside; afterwards the better kinds have melted white wax poured in, which renders them much more durable. The French and Germans produce in this way imitations of the finest oriental pearls of such beauty, that the most practised eye can hardly detect the difference. The bleak is procured in considerable quantities for this purpose from the Thames and other rivers in England. See BLEAK.

The invention of artificial pearls is due to a Frenchman, named Jaquin, in the time of Catharine de Medicis, and the manufacture is now chiefly carried on in the department of the Seine, where great improvements have lately been made, especially in the art of giving the irregular forms of large pearls to the glass-bulbs, and thus increasing the resemblance, and in removing the glassy appearance caused by the exterior glass coating, by exposing it for a short period to the action of the vapour of hydrofluoric acid. Mucilage of fine gum-arabic is also used instead of wax, which increases the translucency, gives greater weight, and is not liable to melt with the heat of the wearer's body—a defect to which those filled with wax are very liable.

Roman pearls differ from other artificial pearls, by having the coating of pearly matter on the

because it seemed to set bounds to the increase of Austrian power. But the Archduke Ferdinand hastened to raise an army, the troops of the empire being for the most part engaged in the emperor's wars in Italy, and intrusted the command of it to the Truchsess von Waldburg, a man of stern and unscrupulous character, but of ability and energy. Von Waldburg negotiated with the peasants in order to gain time, and defeated and destroyed some large bodies of them, but was himself defeated by them on the 22d of April, when he made a treaty with them, not having, however, the slightest intention of keeping it. Meanwhile the insurrection extended, and became general throughout Germany, and a number of towns took part in it, as Heilbronn, Mühlhausen, Fulda, Frankfurt, &c., but there was a total want of organisation and co-operation. Towards Easter, 1525, there appeared in Upper Swabia a manifesto, which set forth the grievances and demands of the insurgents. They demanded the free election of their parish clergy; the appropriation of the tithes of grain, after competent maintenance of the parish clergy, to the support of the poor and to purposes of general utility; the abolition of serfdom, and of the exclusive hunting and fishing rights of the nobles; the restoration to the community of forests, fields, and meadows, which the secular and ecclesiastical lords had appropriated to themselves; release from arbitrary augmentation and multiplication of services, duties, and rents; the equal administration of justice; and the abolition of some of the most odious exactions of the clergy. The conduct of the insurgents was not, however, in accordance with the moderation of their demands. Their many separate bands destroyed convents and castles, murdered, pillaged, and were guilty of the greatest excesses, which must indeed be regarded as partly in revenge for the cruelty practised against them by Von Waldburg. A number of princes and knights concluded treaties with the peasants conceding their principal demands. The city of Würzburg joined them, but the Castle of Leibfrauenberg made an obstinate resistance, which gave time to Von Waldburg and their other enemies to collect and strengthen their forces. In May and June 1525, the peasants sustained a number of severe defeats, in which large bodies of them were destroyed. The Landgraf Philip of Hesse was also successful against them in the north of Germany. The peasants, after they had been subjugated, were everywhere treated with terrible cruelty. In one instance a great body of them were perfidiously massacred after they had laid down their arms. Multitudes were hanged in the streets, and many were put to death with the greatest tortures. Weinsberg, Rothenburg, Würzburg, and other towns which had joined them, suffered the terrible revenge of the victors, and torrents of blood were shed. It is supposed that more than 150,000 persons lost their lives in the Peasant War. Flourishing and populous districts were desolated. The lot of the defeated insurgents became harder than ever, and many burdens of the peasantry originated at this period. The cause of the Reformation also was very injuriously affected. See Satorius, *Versuch einer Geschichte des Deutschen Bauernkriegs* (Berl. 1795); Oehle, *Beiträge zur Geschichte des Deutschen Bauernkriegs* (Heilbronn, 1829); Wachsmuth, *Der Deutsche Bauernkrieg* (Leip. 1834); and Zimmermann, *Allgemeine Geschichte des grossen Bauernkriegs* (3 vols., Stuttg. 1841—1843).

PEA-STONE, PISOLITE, or PISIFORM LIMESTONE, is a kind of calcareous spar or limestone, which occurs in globules from one-eighth of an inch to half an inch in diameter, imbedded in a cement of similar substance. There is generally

a grain of sand in the centre of each globule as the nucleus, around which it has been formed, and the concentric plates of its structure are easily visible. Sometimes the nucleus is merely a bubble of air. P. is found in great masses near the hot springs of Carlsbad, in Bohemia. It is sometimes used for ornamental purposes.

PEAT, a substance formed by the decomposition of plants amidst much moisture, as in marshes and morasses; and sometimes described as a kind of *Humus* (q. v.), formed by the accumulation of the remains of mosses and other marsh-plants. The remains of the plants are often so well preserved in it, that the species can be easily distinguished. Reeds, rushes, and other aquatic plants may usually be traced in peat, and stems of heath are often abundant in it; but it chiefly consists, in the northern parts of the world, of different species of *Sphagnum* (q. v.), or Bog-moss. Mosses of this genus grow in very wet situations, and throw out new shoots in their upper parts, whilst their lower parts are decaying and being converted into peat; so that shallow pools are gradually changed into bogs. It was at one time believed that bogs owed their origin to the destruction of forests, the fallen trees impeding the natural drainage, and causing the growth of those marsh-plants of which peat is formed; and this theory was supported by reference to instances supposed to be authenticated by tradition—as that of the moor of Hattfield in Yorkshire, now consisting of about 12,000 acres of peat, and said to have been a forest of firs, till the Romans under Ostorius, having slain many Britons, drove the rest into the forest, which was then destroyed by the victors. There are, however, satisfactory proofs that peat has accumulated in many places around trees; and firs remaining in their natural position have been found to have six or seven feet of peat under their roots, although other trees, as oaks, are commonly found with their stumps resting on the soil beneath the peat. Yet it is not improbable that the destruction of forests may, in some instances, by impeding the course of the streams which flowed through them, have caused the stagnation of water from which the growth of peat resulted. Some of the largest mosses and fens of Europe occupy the place of forests, which were destroyed by order of Severus and other Roman emperors; and some of the British forests, now mosses, as well as some of those of Ireland, were cut because they harboured wolves or outlaws. The overthrow of a forest by a storm in the 17th c., is known to have caused the formation of a *peat-moss* near Loch Broom, in Ross-shire. Layers of trees are not unfrequently found in peat, which seem to have been suddenly deposited in their horizontal position, and sometimes to have been felled by human hands. It is not improbable, however, that sometimes peat has been formed where the soil has been exhausted by the long-continued growth of one kind of tree. The growth of peat is often rapid: bogs have been known to increase two inches in depth in a year. The surface of a bog sometimes becomes a floating mass of long interlaced fibres of plants, known in Ireland as *Old Wives' Tow*. The vegetation on the surface is sometimes very green and compact, like a beautiful turf.

Peat is vegetable matter more or less decomposed, and passes by insensible degrees into Lignite (q. v.). The less-perfectly decomposed peat is generally of a brown colour; that which is more perfectly decomposed is often nearly black. Moist peat possesses a decided and powerful antiseptic property, which is attributed to the presence of gallic acid and tannin, and is manifested not only in the perfect preservation of ancient trees and of leaves, fruits, &c., but sometimes even of animal bodies. Thus, in some

PEOCARY (*Dycotyles*), a genus of *Pachydermata*, of the family *Suidæ*, much resembling hogs; but having a mere tubercle instead of a tail; only three toes—no external toe—on the hind-feet; the molar teeth and incisors very like those of hogs, but the canine teeth not nearly so long, and not curving

easterly 600 miles through New Mexico and Texas, and flows into the Rio Grande-del-Norte, in lat. about 29° 20' N., long. 102° W.

PECTEN, a genus of lamellibranchiate mollusca, commonly referred to the same family with the oyster (*Ostrea*), which is sometimes called *Pecti-*vida. The shell has neither teeth nor lamina in the hinge; the valves are unequal, one of them being often much more convex than the other; the shape is regular; the hinge is extended by *cara*, and in most of the species both valves have ribs radiating from the umbo to the margin. Hence the name *pecten* (Lat. a comb), from the appearance which they present. The animal has a small foot; some of the species are capable of attaching themselves by a byssus; they are capable also of locomotion by opening and rapidly closing the valves, and in this way can even regain the sea from a short distance by leaping on the shore. Some of the larger species are often popularly called *clams*, a name shared by other bivalves. *P. Jacobus*, a native of the Mediterranean, is the SCALLOP-SHELL which pilgrims were accustomed to wear in front of their hat, in token of their having visited the shrine of St James at Compostella. It attains a size of about 4 inches long and 5 inches broad. *P. mazianus*, found on many parts of the British coast, is about 6 inches broad. It is sometimes eaten, but is hard and indigestible. Several other species are British. Species are found in almost all parts of the world.



Pecten.

Pecary (*Dycotyles torquatus*).

outwards. An approach to ruminants is seen in the stomach, which is divided into several sacs; also in the union of the metacarpal and metatarsal bones of the two greater toes into a kind of cannon bone. A glandular opening on the loins, near the tail, secretes a fetid humour. Only two species are known, both natives of South America, and except the tapira, the only existing pachydermata of the American continent.—The COMMON P., COLLARED P., or TAJACU (*D. torquatus*), is found in almost all parts of South America; the WHITE-LIPPED P. (*D. labiatus*) is found in many parts of it. Both are gregarious; the White-lipped P., often assembling in very large herds, and sometimes doing great mischief to maize and other crops. The herds of the White-lipped P. seem to follow a leader, like those of ruminants. The Common P. chiefly frequents forests, and small companies sometimes take up their abode in the hollow of a great tree. The Common P. is about the size of a small hog, grayish; the hairs alternately ringed with black and yellowish white, bristly; and on the neck longer, and forming a mane. A narrow white collar surrounds the neck. The White-lipped P. is considerably larger, of a darker colour, with conspicuously white lips. The ears are almost concealed by the hair. Both species are capable of being tamed, but are of irritable and uncertain temper. In a wild state they defend themselves vigorously against assailants, making good use of their sharp tusks, and a whole herd combine for defence. The hunter has often to take refuge from them in a tree. They are omnivorous; and if hurtful to crops, render service by destroying reptiles. Their voice is somewhat like that of the hog, but more sharp. Their flesh resembles that of the hog, but is said to be inferior. The glands on the loins must be cut out immediately after the P. is killed, or their fetid humour infects the whole flesh. No attempts seem yet to have been made for the economic domestication of the pecaaries.

PE-CHIE-LE. See CHIE-LI.

PECK, a measure of capacity for dry goods, such as grain, fruit, &c., used in Britain, and equivalent to 2 imperial gallons, or 554.548 cubic inches. It is thus the fourth part of a Bushel (q. v.). The old Scotch peck, the 16th part of a boll, when of wheat, was slightly less than the imperial peck; but when of barley, was equal to about 1.456 of it.

PECORA (Lat. cattle), a Linnæan order of Mammalia, now generally called RUMINANTIA (q. v.).

PECOS, a river of Texas, U.S., rises in the mountains near Santa Fé, New Mexico, runs south-

PECTIC ACID AND PECTINE. See FERRA.

PECTINIBRANCHIATA (Lat. comb-gilled), an order of gastropodous mollusca, having the gills composed of numerous leaflets or fringes, arranged like the teeth of a comb, and affixed to the internal surface of a cavity which opens with a wide opening above the head. The sexes are distinct. All the P. have two tentacles and two eyes, the eyes often stalked. The mouth is produced into a proboscis, more or less lengthened. The eggs are deposited in a mass, with an envelope often of very remarkable and complicated form, which is produced by coagulation of a viscid albuminous matter secreted by a peculiar gland of the female. The P. are very numerous; the greater number of gastropods being included in this order; some have a siphon, and some are destitute of it; some have spiral, and some have simply conical shells. Almost all are inhabitants of the sea or its shores; a few are found in fresh water. To this order belong *Whelks*, *Perrinkles*, *Cocca*, *Volutes*, *Calyptæra*, &c.

PECTORILOQUY is a term of such frequent occurrence in the history of chest diseases as to require a brief notice in this work. If the stethoscope be applied to the chest of a healthy person, and he be requested to speak, the sounds of his voice will be conveyed to the ear of the observer with very different degrees of clearness, according to the part of the chest on which the base of the instrument rests. If, for example, it be applied at the top of the sternum or breast-bone the voice will reach the ear, through the tube, with tolerable distinctness. For a short distance on either side of the sternum, just below the collar-bones, and in the arm-pits, the voice is still heard, but the sound is indistinct and confused. Below the third rib, and over the remainder of the chest, the voice only

PEDI'COLUS. See LOUSE.

PEDIGREE (probably from Lat. *pes*, a foot), a tabular view of the members of a particular family with the relations in which they stand to each other, accompanied or unaccompanied by a notice of the chief events in the life of each, with their dates, and the evidence of the facts stated. Pedigrees are indispensable aids to the student of history. The wars of the Roses, the claim of Edward III. to the crown of France, the relative position of Mary and Lady Jane Grey, the circumstances which brought about the union of the crowns of England and Scotland, the Schleswig-Holstein question—now occupying the attention of Europe—and many other familiar chapters in the history of nations, as well as of families, cannot be read aright without the aid of pedigrees. The materials to be used in the formation of a pedigree are notes of the facts to be set forth, and a recognised series of signs and abbreviations. These notes comprise the name of every person who is to appear in the pedigree, with such dates and circumstances as it may be considered desirable to record. Among the commonest abbreviations are *dau.*, for daughter of; *s.* and *h.*, son and heir of; *coh.*, coheir of; *w.*, wife of; *s. p.* (*sine prole*), without issue; *v. p.* (*vid. patris*), in his father's lifetime; *b.*, born, *d.*, died; *dep.*, deposed; *K.*, king; *E.*, earl, &c. The sign = placed between two names, indicates that they were husband and wife; ∇ indicates that they had children; \downarrow under a name signifies that the person had children. All persons of the same generation are to be kept in the same horizontal line; and the main line of descent is, wherever possible, to be indicated by keeping the successive names in a vertical column. Continuous lines indicate the succession of the different generations. The members of the same family are generally arranged in their order of birth in two groups—the sons first, and then the daughters; but where the same father or mother has children by more than one marriage, the children of each marriage ought to form distinct groups. The actual arrangement, however, of a pedigree must always depend on the leading object which it is intended to illustrate.

Tabular genealogies, generally brief, and meant to illustrate some particular claim of right, are found among the records, public and private, of the early middle ages; but after the incorporation of the English Heralds' College, far more attention was devoted to the compilation of pedigrees of families, more particularly with reference to their claims to dignities and heraldic insignia. In the course of the 16th c., the heralds obtained copies of all such accounts of the English families of any distinction as could be supplied to them, and entered them in the books which contain the records of their official proceedings. Royal commissions were issued under the Great Seal to the two provincial kings-of-arms, empowering them to visit in turn the several counties of England, in order to collect from the principal persons of each county an account of the changes which had taken place in their respective families in the interval since the last preceding visitation, and to inquire what account could be given of themselves by families who had stepped into the rank of gentry, or had become settled in the county since that period. The register-books kept by the heralds and their assistants contain the pedigrees and arms collected in the course of the visitations, with the signatures of the heads of the families. The pedigrees thus collected contain a vast body of information, interesting not only to the professed genealogist, but to every one who would know anything of the distinguished

characters in English history. Some of these books are lost, the rest are scattered among the public and private libraries of the country, the largest collections being in the archives of the College of Arms and the British Museum. After the beginning of last century, the visitations were discontinued, and there has since been no official and regular collection of pedigrees. A standing order of the House of Lords, in 1767, required that before any peer should be allowed to take his seat, Garter-king-of-Arms was to deliver at the table of the House of Lords a pedigree of his family, to be verified by the Committee of Privileges, and eventually preserved in the records of the House, a copy being also registered in the College of Arms. This order was rescinded by Lord Thurlow in 1802, with the view of framing a new one; but, unfortunately, this was never done. Persons sensible of the importance of preserving an authentic account of their descent, frequently record their pedigrees for preservation in the Register of the College of Arms. This register is quite distinct from the heraldic department of that institution, and is open to any one who wishes to preserve evidence of any properly authenticated facts regarding his descent and family.—In Scotland, in the absence of the regular system of visitations which prevailed in England, there is a great deal of evidence regarding the pedigrees of the historical families of the country scattered here and there in public and private collections, including the Advocates' Library and Lyon Office. A register of genealogies, similar to that of the English Heralds' College, exists in the Lyon Office, in which the pedigrees of applicants, after being proved to the satisfaction of the heraldic authorities, are inserted with the accompanying evidence. 'To what extent the register of genealogies in the Lyon Office may be admitted as a probative document, conclusive of the facts which it sets forth, has not been ascertained by actual decision; but there can be no doubt that, in questions both as to property and honours, it would be regarded as a most important adminicle of proof. The genealogical department of the Heralds' College in London is a very important one, and it is to be regretted that the uses of the corresponding department of the Lyon Office are so little understood and appreciated by the public.'—*Lorimer's Handbook of the Law of Scotland*, 2d edit., p. 446.

PEDIGREE, in point of law, is the legal relationship between individuals which is looked to with regard to the descent of property and honours. The occasion in which it comes into question is where a person dies, in which case his property, if he died intestate, is divided among those who are related by blood. The real property goes to one set of relations, and the personal property to others. See **INTESTACY**, **NEXT OF KIN**, **SUCCESSION**, *Paterson's Comp. of English and Scotch Law*, 251, 257.

PEDIMENT, the triangular space over the portico at the ends of the roof of classic buildings. It is enclosed by the horizontal and the *railling* cornices, the latter of which follow the slopes of the roof. The pediment may be called the gable of classic buildings. It is frequently enriched with sculpture, for which it forms a fine setting. The doors and windows of classic buildings are often surmounted by pediments, either straight-sided or curved.

PEDLERS. See **HAWKERS**.

PEDOMETER, an instrument for measuring walking distances. It sometimes has a watch or clock attached. In the patent pedometer of Messrs Payne, William, & Co., there is a repeating watch,

Scott's *Peveril of the Peak*, constant mention is made of this castle, and indeed it may be said to be the scene of the story. The ruins are yearly visited and admired by thousands of persons from all parts of the United Kingdom. The town of P. is now rapidly extending its boundaries, and bids fair to become a place of considerable commercial importance. Population (1861) 2818.

PEEL, SIR ROBERT, a very eminent British statesman, was born, 5th February 1788, near Bury, in Lancashire. His father, Sir Robert Peel (created a baronet in 1800), was a wealthy cotton-spinner, from whom he inherited a great fortune. He was educated at Harrow, and at Christ-Church, Oxford, where he graduated B.A. in 1808—taking a double first-class—and entered the House of Commons in 1809 as member for Cashel, adopting the strong Tory politics of his father. Percival was then prime-minister. P. set quietly about the business-work of the House, feeling his way with that steady prudence and persevering diligence that were the conspicuous features of his character. In 1811, he was appointed Under-secretary for the Colonies; and from 1812 to 1818, he held the office of Secretary for Ireland. In this capacity, he displayed a strong anti-Catholic spirit (whence the witty Irish gave him the nickname of 'Orange-Peel'), and was in consequence so fiercely, or, shall we say, ferociously attacked by O'Connell, that even the cool and cautious Secretary was driven to send the agitator a challenge. The police, however, prevented the duel from taking place. From 1818 till 1822, P. remained out of office, but not out of parliament, where he sat for the university of Oxford. He now began to acquire a reputation as a financier and economist; and in 1819, was appointed chairman of the Bank Committee, and moved the resolutions which led to the resumption of cash-payments. He was still, however, as averse as ever to anything like religious or political reform. No member of the Liverpool-Castlereagh cabinet could have been to appearance more resolute. He even vehemently defended the infamous 'Peterloo Massacre' of 1819. In 1822, he re-entered the ministry as Home Secretary—Canning shortly after becoming Foreign Secretary, on the suicide of Lord Castlereagh. The two worked together pretty well for some time, as P. devoted himself chiefly to financial matters, and especially to the currency; but 'Roman Catholic emancipation' was a question on which Canning was considerably in advance of his brother-secretary; and when the former was called upon by the king, after the resignation of Lord Liverpool, to form a sort of Whig-Tory ministry, P., along with the Duke of Wellington and others, withdrew from office. Yet it is singularly characteristic of this most honest and *compromising* statesman, that even when he seceded (1827), his opinions were veering round to the liberal and generous view of the claims of Roman Catholics; and when the death of Canning, shortly after, led to the formation of the Wellington-Peel government, its great measure—actually introduced by 'Orange-Peel' himself—was the ever-memorable one for the 'relief' of the Roman Catholics (1829). As Home Secretary, he also signalled himself by a re-organisation of the London police force—since popularly called 'Peelers' and 'Bobbies,' their previous sobriquet being 'Charles'—from King Charles I, who (1640) extended and improved the police system—and by the introduction of several other important measures.

Meanwhile, the university of Oxford had rejected its apostate representative, and chosen in his stead Sir Harry Inglis. But now came on the great question of parliamentary reform, which P. firmly

but temperately opposed. In 1830, the Wellington-Peel ministry fell, and was succeeded by a Whig ministry under Earl Grey, which, in 1832, carried the Reform Bill. P. (now, by the death of his father, Sir Robert P.), when he saw that reform was inevitable, accepted defeat and its results with great equanimity. He shrank from anything like factious opposition to the measure, and contented himself with presenting as forcibly as he could the political *per-contra*. After it was passed, he became the leader of the 'Conservative' opposition; and, as we have said, accepting reform itself as a *fait accompli* and irreversible, he only sought by keen and vigilant criticism of Whig measures to retard the too rapid strides of liberalism. In 1833, when the first 'reformed' parliament assembled, P. took his seat as member for Tamworth, which he represented till the close of his life. On the retirement of the Melbourne ministry in November 1834, he accepted the office of prime-minister, but could not succeed in giving stability to his administration, and was compelled again to give place to Viscount Melbourne in April 1835, and resumed his place as leader of the opposition. P.'s conduct in opposition was always eminently patriotic. The Whigs, who were being pressed on the one side by the new Radical party and the Anti-corn Law League, and on the other by O'Connell and the Irish repealers, gradually lost ground, and being narrowly defeated in 1841, on a motion of want of confidence, dissolved parliament. The general election that ensued, was virtually a contest between Free-trade and Protection. Protection won; and when the new parliament met, a vote of no-confidence was carried by a majority of ninety-one. The Conservative party, headed by P., now came into office. The great feature of the new government was the attitude it adopted on the corn-law question. The Whigs, while in office, and even after their expulsion, were bent upon a fixed but moderate duty on foreign corn; the Anti-corn Law League would hear of nothing short of an entire repeal, while Sir Robert was in favour of a modification of the sliding scale of duty which had existed since 1828. He introduced and carried (1842), in spite of strong opposition, a measure based upon this principle. The deficit in the revenue, which had become quite alarming under the Melbourne administration, next engaged his attention, and led him to bring in a bill (1842) for the imposition of an 'income-tax' of 7d. in the pound, to be levied for three years. To alleviate the new burden, P. commenced a revision of the general tariff, and either abolished or lowered the duties on several very important articles of commerce, such as drugs, dye-woods, cattle, sheep, pigs, salted meat, butter, eggs, cheese, and lard. He also shewed himself resolute in the repression of the clamorous and anarchic malcontents of Ireland. O'Connell (q. v.) was tried for conspiracy, and though the judgment against him was set aside on appeal to the House of Lords, the influence of the 'agitator' was broken. The first half of 1845 was marked by the allowance to Maynooth being increased and changed into a permanent endowment instead of an annual grant, and by the foundation of the Irish unsectarian colleges, and other important measures. But the potato-rot in Ireland during the autumn, followed by a frightful famine, rendered 'cheap corn' a necessity, if millions were not to starve. Cobden and the League redoubled their exertions. Lord John Russell announced the views of the Whig party on the crisis, and Peel again yielded. He told his ministerial colleagues that the corn-laws were

and appearance. The breast is greatly expanded, much broader than high, the gill-openings in the sides; the pectoral fins are extremely large and strong; a long snout projects before the eyes, and the mouth is situated under and at the base of it; the body is surrounded by three knobbed or spinous rings. One species (*P. draco*) is called the SEA DRAGON, another (*P. volans*) is popularly known as the PEGASUS.

PEGS. Small square pointed pegs of wood have of late years been introduced by the Americans into the manufacture of boots and shoes, for the purpose of connecting the parts of the sole and upper leather together without sewing. See SHOEMAKING. This invention has been so extensively adopted, that the manufacture of wooden pegs, for this purpose, has become an important trade in America and Bohemia, from which countries a considerable importation is made to Great Britain. They are chiefly made of maple-wood, and are rarely more than an inch in length.

PEGU', a province of British Burmah, lies between the parallels of 15° 14'—19° 27' N. lat., and the meridians of 94° 13'—96° 52' E. long., and is divided for fiscal purposes into the following districts or provinces:

	Area in Square Miles.	Population, 1862.
Rangoon,	9800	232,507
Bassein,	8900	225,876
Prome,	5494	232,867
Henzada,	2300	118,614
Tharawady,	2160	128,248
Tonghoo,	3900	66,773
Total,	39,454	1,094,885

Of this number of inhabitants, about 800,000 are true Burmans; but in addition to these, there is a sprinkling of Karens, who live in the wild and hilly districts, Taleins or Peguers, Shans, Khyengs, Yabaings, Indians, Chinese, and a few other races.*

The principal river of P. is the Irrawadi (q. v.). In March, the river begins to rise, and gradually increases in volume till its waters are forty feet above their lowest level. They rapidly subside in October, when the rains cease, and the north-east monsoon sets in. The revenue of P. for the year 1862—1863 was 5,553,316 rupees; though, under the rule of the king of Burmah, it did not amount to half that sum. P. was annexed to British India at the close of the Burman war of 1852, since which time slavery has ceased to exist, schools have been established, and various public works undertaken.

Rice and teak timber are the principal exports. A flotilla of steamers keep up the communication between Rangoon (q. v.), the principal port, and the chief stations on the Irrawadi, conveying troops, stores, passengers, and mails from place to place.—Winter's *Six Months in British Burmah* (Lond. 1858); Martin's *British India* (Lond. 1862).

PEHLEVI (Valour, Power; *Zabân Pehlevi* = 'Language of Heroes') is the name of an ancient West-Iranian (Median and Persian) idiom, in use

* Lieutenant-colonel A. P. Phayre, chief commissioner of British Burmah, in his report for 1863 (Rangoon, 1863) states the population of Pegu as follows:

Races.	
1. Europeans and their descendants,	2,409
2. Burmese, including Aracanese and Talings,	924,091
3. Karens,	249,518
4. Shans and Tongthoos,	24,689
5. Chinese,	1,724
6. Khyengs,	18,879
7. Indians,	11,844
8. Mohammedans of Burmah,	2,089
9. All races not included above,	9,112
Total,	1,244,385

chiefly during the period of the Sassanides (235—640 A. D.), who, wishing fully to restore the ancient Persian empire, endeavoured also to reinstate the primitive national language, fallen into disuse as a court-language since the time of Alexander's conquest. Yet they did not fix upon the pure Persian as it was still spoken in the interior, but upon the dialect of the western provinces, largely mixed with Semitic words, to which Arian terminations were affixed. The grammatical structure of the P. presents almost the same poverty of inflections and terminations as the present Persian. Although, however, less rich than Zend (q. v.) in inflection and accentuation, it yet boasts of the same copiousness of words as that dialect, to which it in reality succeeded. It is written from right to left, and the letters are mostly joined. The remnants of P. extant consist of coins, inscriptions (found at Hagiabad, Persepolis, Kirmanshah, &c.), and a number of books, all relating to the religion of Zoroaster. The most important of these are the translation of the chief part of the Zend-Avesta (Yazna, Visparad, and Vendidad), and such original religious works as the Bundehesh, Shikandgumâni, Dinkart, Atash Barâm, &c. The P. of the books differs from that of the inscriptions and coins to such a degree—according to the larger or smaller preponderance of the Semitic element—as to have misled investigators (Westergaard and others) to assume that two utterly distinct languages, a purely Iranic and a Semitic one, had been used somewhat indiscriminately at the time. The non-Iranian element is called Huzvareh (Huzoresh) by the Parsee priests, who, taking advantage of the ambiguity of the P. alphabet, often substitute the corresponding Persian for the foreign words. The Iranian part of the P. differs little from the Persian of our own day, and, in fact, the P. changed first into Parsee, and subsequently into modern Persian, simply by getting rid first of its Chaldee, and then of those of its Iranian words which had become obsolete. The chief use of the P. dialect at present is the assistance it offers towards the elucidation of the Zend itself. For the history of its investigation since it was first made known in Europe, we refer to PERSIAN LANGUAGE AND LITERATURE.

PEI-HO', a river of China, which, rising on the confines of Tartary, traverses the northern part of the province of Chih-le (q. v.) or Pe-chih-le, and falls into the Gulf of Pe-chih-le, in about 38° 30' N. lat.

The attack on the escort of the British and French ambassadors, whilst ascending the Pei-ho to Peking (June 1859), led to the war with China of 1860. See CHINA.

PEINE FORTE ET DURE, the 'strong and hard pain'; a species of torture formerly applied by the law of England to those who, on being arraigned for felony, refused to plead, and stood mute, or who peremptorily challenged more than twenty jurors, which was considered a contumacy equivalent to standing mute. In the beginning of the 13th c. this penalty seems to have consisted merely in a severe imprisonment with low diet, persisted in till the contumacy was overcome. But by the reign of Henry IV., it had become the practice to load the offender with weights, and thus press him to death; and till nearly the middle of the 18th c., pressing to death was the regular and lawful mode of punishing persons who stood mute on their arraignment for felony. The motive which induced an accused party, in any case, to submit to this penalty rather than to plead, was probably to escape the attainder which would have resulted from a conviction for felony. During the 15th, 16th, 17th, and even the 18th c., various cases are recorded

moderation, kindness, and sympathetic appreciation of the wishes of the Athenians, that have won him the praise and esteem of all later ages, in spite of his usurpation. He firmly, but not harshly, enforced obedience to the laws of Solon; emptied the city of its poorest citizens, and made them agriculturists, supplying such as had no resources with cattle and seed; secured provision for old and disabled soldiers; bestowed great care on the celebration of the religious festivals of the Atticans, and even introduced some important changes; encouraged literature more than any Athenian had ever done before—it is to P., or to the poets, scholars, and priests about him, that we owe, for example, the first complete edition of Homer (q. v.); and, like his still more brilliant successor in the following century, Perikles, he adorned Athens with many beautiful buildings, such as the Lyceum, a temple to the Pythian Apollo, another to Olympian Zeus, &c.

PEKAN, or WOOD-SHOCK (*Martes Canadensis*), a species of Marten (q. v.), very nearly allied to the sable, a native of the northern parts of North America. It is twice the size of the pine marten, and is generally of a grayish brown colour; the legs, tail, and back of the neck marked with darker brown. The fur, although not so valuable as sable, nor even as that of the pine marten, is useful, and large quantities are sent to the market. The P. lives in burrows, which it excavates in the banks of rivers; and feeds chiefly on fish and other aquatic animals.

PEK'IN, or PE-K'ING (i. e., Northern Capital), the capital of the Chinese empire since 1408 A. D., is situated in lat. 39° 54' 13" N., and long. 116° 28' 54" E., in the northern province of Chih-le, at a distance of nearly 100 miles from the sea, and about 60 miles from the great Chinese Wall. The population of the city is estimated at about 2,000,000; the entire area, in which is included much vacant space, at 27 square miles, and the circuit of the walls is said to be about 25 miles. These walls are made of earth, with an outer casing of brick, having embrasures for musketry or ordnance every 50 feet; their height is about 40 feet; thickness at the base about 30 feet, and at the top 12 feet, which is paved with stone, and where horsemen can ascend by a ramp or sloping way. At intervals of 60 yards are square towers, projecting outwards from the walls 50 or 60 feet. The gates which give access to the city from the surrounding country are 16 in number, nine of which belong to the Northern or Tartar City, and seven to the Southern or Chinese City. Over each gate is a watch-tower nine stories in height, and loopholed for cannon.

The city of P. is divided into two parts, separated by a wall with three gates. These two sections form respectively the Northern, Interior, or Tartar City, called *Nei-tching*; and the Southern, Exterior, or Chinese City, called *Wai-tching*.*

1. *Nei-tching, or the Northern City*, has three distinct divisions or enclosures—viz., the Prohibited City, the Hwang-Ching, or Imperial City, and the General City. The first of these—the innermost or

central block—is surrounded by a yellow wall about two miles in circumference, which shuts in the palaces, pleasure-grounds, and temples of the sacred city. Here live the emperor and his family, the ladies of the court, and the attendant eunuchs. 'Keen-taing-Kung,' or 'the Tranquil Palace of Heaven,' the emperor's private palace, is the most magnificent of the royal residences. Other notable buildings of the prohibited city are 'Fung-seen-teen,' the Temple of Imperial Ancestors; Ching-hwang-meau, the Temple of the Guardian Deity of the city; Nan-heun-teen, the Hall of Portraits of the Chinese emperors and sages; and Wan-yuen Kio, the Imperial Library. The Imperial City is built around this central block, and contains the palaces of the princes, temples, some of the government offices, and spacious pleasure-grounds. From Wang-yung-teen, the Imperial Printing-office, the *Imperial*, or *Pe-king Gazette* is issued daily for all government officials throughout the empire. This is the only publication in China approaching to a newspaper, and is named *King Paow*, or 'Great Report.' It is not merely a report for official information, but forms the basis of the national annals, and is compiled from the daily records of the Supreme Council. Besides the daily edition, there is one published every two days, which is sold to the public, and from which is withdrawn decrees and reports of a secret character. The journal itself is a miserable production even for China, and consists of from 15 to 20 pages, not so large as common note-paper. The General City—the third division or enclosure—lies between the Imperial City and the outside walls; it is more densely populated than either of the preceding divisions, and contains the most important of the public offices, including the six supreme tribunals or boards; the Le-fan-yuen, or the Office of Foreign Affairs; Too-cha-yuen, or the Imperial Censorate; Han-lin-yuen, or the Grand National College; the Great Medical College; the Observatory; the Police office; and the British, French, and Austrian legations, which are close to the south wall. The British minister resides in the Leang-kung-fou, or the Palace of Leang, a gorgeous building, consisting of four or five large halls, and covering many acres of land. The principal streets of the general city—from 140 to 200 feet wide and unpaved—are continuous lines of shops painted red, blue, and green, decorated with staring signs and resplendent with Chinese characters highly gilt. By day and by night, by the light of the sun, or by the illumination of torches and paper lanterns, the roar of these great thoroughfares is incessant; shopkeepers, pedlars, mountebanks, quack-doctors, passengers on foot or on horseback, each and all contributing to the general hubbub. The minor streets and lanes, where the houses of the populace are mingled with public offices, temples, stores, and manufactories, are by no means pleasant places, their general characteristics being an 'insupportable odour,' and one-sided brick houses with roofs of a gray colour. There is 'Fetid Hide Street,' 'Dog's-tooth Street,' 'Dog's-tail Street,' 'Barbarian Street,' and many others with names equally uninviting.

2. *Wai-tching, or the Southern City*, is the second great division of Pekin. It measures about four miles from east to west, and two miles, or less, from north to south; but a great portion of the enclosed space is laid out in parks and gardens. Teen-Tan, or the Temple to Heaven, and Tec-Tan, or the Temple to Earth, with their grounds, occupy a considerable space; the theatres and places of public amusement are likewise situated in the Southern or Chinese City. Robert Fortune, who has lately visited P., describes its most peculiar

* Northern City and Southern City are the most correct terms. The latter was added to the more ancient Northern City, and was originally designed to encircle it; hence it was called the Exterior City, in contradistinction to the Northern or Interior City. It was also intended to reserve the Northern City for the Tartars, and the Southern City for the Chinese, as the names still imply; but in point of fact, the Tartar City contains as many Chinese as Tartars; and it is not surrounded by the so-called Chinese City, which latter has only been added on the south side.

and that our victory does not come from God's assistance, but from our free-will. Although the final sentence condemnatory of these doctrines (see PELAGIUS) was very generally accepted, yet the recusant party was not wanting in energy and ability. The great champions on each side were Augustine for the orthodox, and Julianus, Bishop of Eclanum, for the Pelagians. Of so much of the controversy as regards original sin, the history has been already related; that on grace and free-will was more subtle, and has led to more numerous divisions on the side of orthodoxy as well as of dissent. In order to evade the condemnation of the doctrine originally ascribed to them as to grace, Pelagius and his followers declared that they did not deny the necessity of grace; but by this name they did not understand any real and internal supernatural aid given by God in each particular action, but only either some general external assistance, such as preaching, the Scriptures, good example, &c., or an aid given which might facilitate and secure the particular work, but which was by no means necessary for its accomplishment. Whether, indeed, they at any time admitted any real internal grace, is a question much disputed. Grace is of two kinds—that which moves the will, and that which enlightens the understanding. It is necessary, too, to distinguish two periods in the history of P.—one before the appearance of the *Epistola Tractoria* of Pope Zosimus; the other, subsequent to that decree. In the first period, it would seem that the Pelagians did not admit the necessity of any internal grace whatever; in the latter, they admitted the necessity of a grace of the intellect, but not of the will; or if they seemed to speak of any internal grace of the will, it was only as facilitating man's act, not as at all necessary to his doing it. The Pelagian theory, in a word, was, that man, as coming from his Creator's hand, possessed in himself, and as constituents of his own nature, all the powers which are necessary for the attainment of salvation; that by the faithful employment of these natural powers, without any further aid whatever from God, he merits eternal life, and all other rewards, by a strict title of justice; and that, to suppose grace to be necessary, is in truth to destroy the essence of free-will. This doctrine was somewhat modified in the Semi-Pelagian System (q. v.). The Catholic schools, all without exception, maintain the necessity of grace for the performance, not only of all meritorious, but of all supernatural good works; and they are equally unanimous in maintaining that the grace so given, even that which is called 'efficacious,' does not destroy the freedom of the will. They distinguish between the 'natural' and the 'supernatural' order, and between the powers and gifts which are proper to the one and to the other. For the attainment of all the ends of the natural order, man possesses, by his very constitution, all the powers and all the gifts which are necessary; and by the proper use of these powers, he is able to merit all the rewards which belong to the natural order. He is able, therefore, without any supernatural grace, to perform morally good works (as acts of natural benevolence, the fulfilment of the ordinary duties to his neighbour, &c.), and to fulfil the purely natural obligations. But in order to work in the supernatural order (such as the love of God above all things for His own sake, faith in Him as the author of all good, &c.), and the rewards which are promised for such works, the will of man must be moved and strengthened by supernatural grace, with which the will freely co-operates, but which is a purely gratuitous gift of God—so purely gratuitous, that although God has promised eternal life as the reward of man's co-operation, yet the merit arises

entirely from God's gift and promise, and not from the natural powers of the human will.

Without going into the details of the teaching of the Catholic schools, it will be enough to particularise the most remarkable among them. Of these, the chief are the Molinist, which, giving most to liberty, lies nearest to the border of P., but is clearly distinguished from it by maintaining the necessity of grace for every supernatural act; and the Thomist and Augustinian, which give most to grace, but at the same time expressly preserve the freedom of man's will. The Thomists are often represented as denying the freedom of man's actions under grace, but although it is difficult to explain, in popular language, their method of reconciling both, yet to those acquainted with the scholastic terminology, their distinction between the infallible efficacy of grace, and its imposing necessity on the will, is perfectly appreciable. In this they, as well as the Augustinian school, differ from the Jansenists (q. v.). The Jansenists, indeed, regard the Molinist school as a plain revival of P., and they profess that they alone represent fully, in their own system, the very same position which St Augustine formerly maintained against that heresy in its first origin.

In the Reformed Church, the Arminian doctrine may be said to correspond in the main with the Molinist system in the Roman Church. The Gomarists, in most, although not in all particulars, fall in with the Jansenist views. The Pelagian views are distinctly represented in modern controversy by the Socinians and Rationalists; and indeed very many of those who, outside of the Roman Church, have at various times engaged in the predestinarian controversy on the side of free-will, have leaned towards, if they have not fully adopted, the Pelagian view. In this controversy, however, the practice, which is not uncommon in polemics, of imputing to an antagonist the extremest views of the particular side to which he leans, has been specially noticeable. The Jesuits have been stigmatised, even by their Catholic antagonists, as Pelagians; the Thomists are called by the Jesuits indiscriminately Jansenists and Calvinists; while both unite in representing Calvin and his school as in substance Manichean.

Hardly one among the many Christian controversies has called forth a greater amount of subtlety and power, and not one has so long and so persistently maintained its vitality. Within the twenty-five years which followed its first appearance, upwards of thirty councils (one of them, the General Council of Ephesus) were held for the purpose of this discussion. It lay at the bottom of all the intellectual activity of the conflicts in the medieval philosophic schools; and there is hardly a single subject which has come into discussion under so many different forms in modern controversy. See JANSEN, ARMINIUS, GRACE, PREDESTINATION, REPROBATION, ORIGINAL SIN, TRADUCIANISM.

PELAGIUS, a celebrated heresiarch of the 5th c., author or systematiser of the doctrine known as PELAGIANISM (q. v.). Of his early life, little is known. He was probably born about or before the middle of the 4th c., in Britain, or according to some, in Bretagne, his name being supposed to be a Greek rendering (*Pelagios*, of or belonging to the sea) of the Celtic appellation *Morgan*, or *sea-born*. He was a monk, but the time and place of his entering that state are unknown; it is certain, however, that he never entered into holy orders. He settled in Rome, and at the end of the 4th c. he had already acquired a considerable reputation for sanctity and for knowledge of the Holy Scriptures and the spiritual life. P. does not appear to have himself been a very active propagandist; but he had

from the Greek *Pelagos* (the Sea), *pelazo* (to approach), or *peleia* and *agros* (to till the field), &c.—‘a name, in fact,’ as Niebuhr says, ‘odious to the historian, who hates the spurious philology out of which the pretences to knowledge on the subject of such extinct people arise’—designates a certain tribe or number of tribes who inhabited Italy, Thracia, Macedonia, a part of Asia Minor, and many other regions of Southern Europe, in prehistoric times. Ethnologically, they belong to the same race as the great stock of the earliest known settlers, that reached from the Po and the Arno to the Rhyn-dakus (near Kyzikus). Yet no Pelasgian town or village existing in Greece Proper after 776 B.C., speculation has, ever since the commencement of European historiography, been busy trying to supply the facts that were wanting to ascertain the exact origin and history of these predecessors of the Hellenes and Romans; and so futile have all efforts in this direction remained, that the very term *Pelasgi* has, from the days of Homer to our own, been used almost arbitrarily to designate either a single obscure division of a tribe like the *Leleges* and the *Dolopes*, or as an equivalent for all the Greeks of a very early period. In this latter sense, they are spoken of by *Æschylus*, *Herodotus*, *Homer*; while they are considered one of the branches of the race or races that peopled Greece, by *Thucydides*, *Strabo*, and most modern writers, the word thus not being a comprehensive term, like *Arian*, but a narrowly circumscribed one, like *Hindu*. Recent investigation seems, as regards their previous history, to lead to the result, that soon after the first immigration of Turanians, they, like other tribes, left their Asiatic homes, and proceeded towards Europe. They are found at a very early period settled in Asia Minor; and *Homer* speaks of them as allies of the *Trojans*. They then seem to have spread themselves, by way of the *Propontis* and *Ægean*, and again by *Crete*, over many of the islands between the two continents; and finally, came to occupy a great part of the Hellenic mainland—*Thessaly*, *Epirus*, the *Peloponnese*, *Attica*, *Macedonia*, *Arcadia*, provinces which, one and all, up to the latest period, bore distinct traces of the once undisputed sway of the *Pelasgians*. According to *Herodotus*, the Hellenes themselves sprang from them; and there can hardly be a doubt that they formed a most important element in the formation as well of that most gifted of nationalities, as of the Latin people. The early *Etruscans* (q. v.) were P. to a certain extent; and the southern tribes of the *Peucetians*, *Enotrians*, and *Iapygians* are distinctly declared by ancient writers to belong to their race. The step from Greece into Italy is natural enough. What caused their wanderings originally, is difficult to conjecture; but it may not unreasonably be assumed, that they were caused to a certain extent by immigrations of eastern tribes, such as the *Lydians*, *Phrygians*, *Carians*, who pushed them further and further west, as they took possession of their old homes. A special stock was formed by the *Tyrrhenian Pelasgi*, whose gradual advance in Greece may be traced from *Acarmania* to *Boeotia*, thence to *Attica*, and later still, to the *Hellespont*, *Lemnos*, &c. A strong protest, however, must be recorded here on the part of some modern writers against the assumption of others, that the P. were in reality the original population of all Italy, as they were of the greatest part of Greece (*Pelasgia*). It is absurd, they argue, to suppose that a rich and populous nation, which had held a country like Italy for many centuries, should suddenly, just at the approach of historical times, die out without leaving even such single remnants as the *Pelasgi* settlements in Greece mentioned by *Herodotus*. These aboriginal Italian P. are, according to them, neither

more nor less than a mere hypothesis of ignorant ancient writers, who wished to explain the ethnological and philological affinity between the two classical nations in an easy manner, and who, anticipating the questions about a contemporary colony, kill the whole nation off by pestilence and famine.

The *Pelasgians*, from what we can glean about them, would appear to have been a highly intellectual, receptive, active, and stirring people, of simple habits withal, chiefly intent upon agricultural pursuits. Several improvements in this province were distinctly traced back to them, such as the ploughing with oxen—for which purpose they had to invent the special goad; further, the art of surveying, and the like. Yet they were no less warlike when attacked and driven to self-defence, and the trumpet, which calls the widely scattered troops to the attack, was supposed to have been first used by them. That the art of navigation was well known to them, is shewn sufficiently by their incessant migrations over sea and land. Of their architecture, in that style which, in default of a better name, has been called *Cyclopean* (q. v.), remnants are still existing. The names *Larissa*, *Argos*, *Ephyra*, frequently met in ancient Greece, were bestowed by them upon their fortified cities, and are only generic names, expressive of either mountain fortresses or strongholds in plains. Wishing to remain in peace, they endeavoured to keep off the invader by walls so enormously strong, that it really seems most surprising how they ever could have been taken. Besides these, they built canals, dams, and subterranean water-works of astounding strength and most skilful construction. The accompanying woodcut represents the



Fig. 1.—Section of Tomb of Atreus at Mycenæ.

tomb or treasury of *Atreus* at *Mycenæ*, vaulted with a fine pointed ‘horizontal arch,’ 46½ feet in diameter. Of their sculpture, which they so doubt likewise cultivated to a certain degree, we have but very small relics, such as a head of *Medusa*, and a

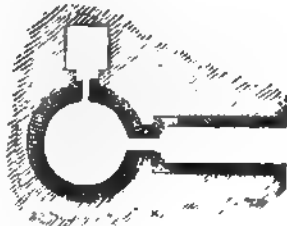


Fig. 2.—Plan of Tomb of Atreus at Mycenæ.

Xoanon (Divine Image) of *Orpheus*; besides these, certain traces of their special mystic worship are to be found in archaic representations,

acquaintance with white men, however, seems to have altered their disposition, and several vessels, while visiting these islands, within comparatively recent years, have narrowly escaped being cut off. The islands are said to have been discovered by the Spaniards in 1545.

PELICAN (*Pelecanus*), a genus of birds of the family *Pelecanidae* (q. v.), having a very long, large, flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible, which is composed of two flexible bony branches meeting at the tip, a great pouch of naked skin is appended; the tongue is very short, and almost rudimentary; the face and throat are naked; the wings of moderate length, the tail rounded. The species are widely distributed, frequenting the shores of the sea, lakes, and rivers, and feeding chiefly on fish. Although birds of powerful wing, they are seldom seen at a great distance from land. All of them are birds of large size. They take their prey by hovering over the water, and plunging upon it when it appears. They often fly in large flocks, and the sudden swoop of a flock of pelicans at a shoal of fish is a striking and beautiful sight. They store up their prey in their pouch, from which they bring it out at leisure, either for their own eating, or to feed their young. The pouch is capable of being wrinkled up into small size, and of being greatly distended.—The COMMON P. (*P. onocrotalus*) is as large as a swan, white, slightly tinged with flesh colour, and in old birds,

endorsed, and wounding her breast with her beak. When represented in her nest feeding her young with her blood, she is called a pelican in her piety.

PE'LION, the ancient name of a wooded mountain range in Thessaly, extending along the east coast. Its eastern side descends in steep and rugged precipices to the sea. Further to the north, near the mouth of the Peneus, is the steep conical peak of Ossa (q. v.), which, according to the classic myth, the Titans placed upon the summit of P., in order to scale Olympus, the abode of the gods. The modern name is Zagorá, and as of old, its sides and summit are clothed with venerable forests of oak, chestnut, beech, elm, and pine.



Pelican, in Heraldry.

PELISSIER, AIMABLE JEAN JACQUES, Marshal of France, Duc de Malakoff, born in 1791 at Maromme, near Rouen. His father was a small farmer, little above the degree of a peasant. P. was first sent to the Lyceum at Brussels. At twenty, he gained admission to the celebrated French artillery college of La Flèche, and was soon transferred to the special school of St Cyr. He entered the artillery of the Royal Guard as sub-lieutenant in 1814, and being transferred to the 57th Regiment of the line, which was not called upon to do duty after the return of Napoleon from Elba, he escaped the dilemma of declaring either for or against the Emperor. He served on the staff in Spain in 1823; made the campaign of the Morea in 1828; joined the first expedition to Algiers in 1830 as major of cavalry; and in 1839 returned to Algeria with the rank of lieutenant-colonel. He commanded the left wing of the French army at the battle of Isly. In 1845, he acquired an unenviable notoriety by suffocating more than 500 Arabs who took refuge in the caves of Ouled-Kiah in the Dahra. Marshal Soult, then Minister of War, did not venture to approve this atrocity, but Marshal Bugeaud, commander-in-chief in Algeria, declared that P. only carried out his positive orders. By 1850, he had attained the rank of General of Division. When the news of the *coup d'état* reached Algiers, he espoused the cause of the emperor, and placed the province of Algiers under martial law until order was restored. In the war with Russia, he obtained in 1855 the command of the first corps of the Crimean army, and soon succeeded Marshal Canrobert in the chief command, when a change came over the fortunes of the campaign. The Russians were defeated on the Tchernaya, and on the 8th September the Malakoff, the key of Sebastopol, was carried. After the fall of Sebastopol, P. received a marshal's baton, and on his return to France, was created Duc de Malakoff and a senator, and received a dotation of 100,000 francs. He also received the order of a G.C.B. from Queen Victoria. In 1858, he came to London as the French ambassador, but resigned his post, for which he had little relish, in the following year. He was then named Governor-general of Algeria, where he died (May 1864) of congestion of the lungs.

PELLA, the ancient capital of Macedonia, and the birthplace of Alexander the Great, was situated on a hill, and surrounded by marshes. It was a wealthy and powerful city, but declined under the Romans until it became a place of no consequence, and in the middle ages there remained only a strong castle called Bodens. Its site has been identified

Pelican (*Pelecanus onocrotalus*).

the breast golden yellow. The quill-feathers are black, but are scarcely seen except when the wings are expanded. It is a native of the eastern parts of Europe, and of many parts of Asia and Africa, and frequents both the sea-coast and also rivers and lakes. It makes a nest of grass on the ground in some retired spot near the water, often on an island, and lays two or three white eggs. The parents are said to carry water to their young, as well as food, in their pouch. During the night, the P. sits with its bill resting on its breast. The nail or hook which terminates the bill is red, and Mr Broderip supposes that the ancient fable of the P. feeding its young with blood from its own breast has originated from its habit of pressing the bill upon the breast, in order the more easily to empty the pouch, when the red tip might be mistaken for blood.—The RUFOUS-NECKED P. (*P. fuscus*) abounds in the West Indies and in many parts of America. Other species are found in other parts of the world, and in some places the number of pelicans is prodigious, particularly in some of the most southern parts of the world.

In Heraldry, the Pelican is drawn with her wings

PELLS, CLERK OF TRE (Lat. *pellis*, a skin), a clerk belonging to the Court of Exchequer in England and Ireland, whose office was to enter every teller's bill into a parchment or skin, called *pellis receptorum*, and also to make another roll of payments, which was called *pellis exituum*, and which shewed the warrant under which the money was paid. The office was abolished in 1834 by the statute 4 and 5 Will. IV. c. 15, which transferred the duties to the comptroller-general, who thereupon assumed the custody of the records; and the Treasury thereafter established new forms of books, accounts, and warrants.

PELOPIDAS, a celebrated Theban general, of noble descent, noted among his fellow-citizens for his disinterested patriotism. The inviolable friendship between himself—one of the richest men in Thebes—and Epaminondas—one of the poorest—is among the most beautiful things recorded in Greek history. In 382 B.C. he was driven from Thebes by the oligarchic party, who were supported by the Spartans, and forced to seek refuge at Athens, whence he returned secretly with a few associates, 379 B.C., and recovered possession of the Kadmeia, or citadel, slaying the Spartan leader, Leontiades, with his own hand. Plutarch gives us a vivid picture of the adventurous exiles gliding quietly in disguise into the city on a winter afternoon, amid bitter wind and sleet. Having been elected Boetarch, in conjunction with Melon and Charon, he set about training and disciplining his troops, so that they soon became as formidable as the Lacedæmonians, and were successful in several small encounters with the latter. His 'sacred band' of Theban youth largely contributed to the victory of Epaminondas at Leuctra (371 B.C.), but failed in a subsequent attack on Sparta itself. In the expedition of the Thebans against the cruel tyrant, Alexander of Phæræ (368 B.C.), he was, after several important successes, treacherously taken prisoner, when in the character of an ambassador; but was rescued by Epaminondas in the expedition of the following year. He was then sent to Susa, as ambassador from Thebes, to counteract the Spartan and Athenian intrigues going on at the court of Persia, and behaved himself very nobly while there. His diplomacy was successful. In 364 B.C., a third expedition was planned against Alexander of Phæræ, who, as usual, was threatening the Thessalian towns. The command was given to P., and in the summer he marched into Thessaly, where he won the battle of Kynoskephale, but was himself killed while too eagerly pursuing the foe. He was buried by the Thessalians with great pomp.

PELOPIUM was the name given, about the beginning of the present century (1802), by Rose to a new metal, which he thought he had discovered in the mineral Columbite. It was subsequently ascertained that it was identical with Niobium.

PELOPONNESIAN WAR. See GREECE.

PELOPONNESUS (i.e. the isle of Pelops), now called the Moreæ (q. v.), a peninsula, which formed the southern part of ancient Greece, Hellas Proper being situated to the northward of the isthmus, on which stood the city of Corinth. See GREECE. The whole area is less than 9000 square miles. In the most flourishing periods of Grecian history, the P. had a population of more than two millions, although at present it has little over half a million. Among its most important cities were Sparta in Laconia, and Argos the capital of Argolia. Sparta acquired, after the Messenian War, a decided supremacy over the other states, and disputed the supremacy with Athens in a war of almost thirty years' duration (431–404 B.C.)—

the famous 'Peloponnesian War,' of which the history has been written by Thucydides. After the Roman conquest, the P. formed part of the province of Achaia, and subsequently belonged to the Byzantine empire. For its later history, see MOREA.

PELOPS, in Greek Mythology, the grandson of Zeus, and the son of Tantalus, was slain by his father, and served up at an entertainment which he gave to the gods, in order to test their omniscience. They were not deceived, and would not touch the horrible food; but Ceres, being absorbed with grief for the loss of her daughter, ate part of a shoulder without observing. The gods then commanded the members to be thrown into a cauldron, out of which Clotho brought the boy again alive, and the want of the shoulder was supplied by an ivory one. According to the legend most general in later times, P. was a Phrygian, who, being driven by Illos from Sipylus, came with great treasures to the peninsula, which derived from him the name of Peloponnesus, married Hippodamia, obtained her father's kingdom by conquering him in a chariot-race, and became the father of Atreus, Thyestes, and other sons. But in what appear to be the oldest traditions, he is represented as a Greek, and not as a foreigner. He was said to have revived the Olympic games, and was particularly honoured at Olympia.

PELTRY, a general term applied to the trade in skins of wild animals, and to the skins themselves. It is understood to mean only skins undressed, except by drying, and chiefly those which, when dressed, are called furs, and it is especially applied to the produce of North America and the Hudson's Bay Territory, although all others are included. The following table will shew the kind of skins meant, and the vast destruction of animal life which is necessitated by this valuable branch of commerce.

PELTRES IMPORTED INTO GREAT BRITAIN IN 1880.

Common Name.	From Hudson's Bay Territories.	From other Countries.	Total Imports.
Badger, . . .	1284	5618	6912
Bear, . . .	8043	10,549	18,592
Beaver, . . .	108,130	118,176	226,306
Cat, . . .	...	19,688	19,688
Chinchilla, . .	...	18,544	18,544
Deer, . . .	2695	73,891	76,586
Dog, . . .	...	3142	3142
Elk, . . .	12	363	375
Ermine, . . .	1251	313,909	315,160
Fisher, . . .	6430	10,869	17,299
Fitch, . . .	...	24,371	24,371
Fox, . . .	21,311	107,518	128,729
Gout, . . .	6430	4439	10,869
Hare, . . .	315	2,108,446	2,108,261
Kid, . . .	...	485,480	485,480
Killnaki, . . .	...	61,965	61,965
Lamb, . . .	...	1,194,592	1,194,592
Leopard, . . .	...	186	186
Lion, . . .	...	19	19
Lynx, . . .	15,969	19,072	35,041
Marmot, . . .	...	232	232
Marten, . . .	77,979	98,769	176,748
Mink, . . .	32,699	116,926	149,625
Monkey, . . .	...	5787	5787
Musquash, . .	205,694	2,063,059	2,268,753
Nutria, . . .	...	1,043,348	1,043,348
Otter, . . .	13,519	27,180	40,699
O. r. Sea, . . .	137	168	303
Panther, . . .	...	78	78
Rabbit, . . .	29,972	316,089	346,061
Raccoon, . . .	2636	787,892	790,528
Sable, . . .	...	332	332
Seal, . . .	10,471	561,677	572,148
Sheep, . . .	...	3,257,918	3,257,918
Skunk, . . .	3759	134,617	138,376
Squirrel, . . .	10,471	164,976	175,447
Swan, . . .	1043	2932	3975
Tiger, . . .	...	380	380
Weasel, . . .	...	463	463
W. musk, . . .	3639	...	3639
Wolf, . . .	6059	6186	12,245
Wolverine, . .	1398	1453	2851

PELVIS.

ischium, and one for the pubes—and five secondary ones for various processes, &c. The first centre appears in the lower part of the ilium, at about the same period that the development of the vertebrae commences, viz., at about the close of the second month of fetal life; the second in the body of the ischium, just below the acetabulum, at about the third month; and the third in the body of the pubes, near the acetabulum, during the fourth or fifth month. At birth, the crest of the ilium, the bottom of the acetabulum, and the rami of the ischium and pubes, are still cartilaginous. At about the sixth or seventh year, these rami become completely ossified; next, the ilium is united to the ischium; and lastly, the pubes is joined to the other two in the acetabulum. The complete ossification of the bone, from the secondary centres in the crest of the ilium, the tuberosity of the ischium, &c., is not completed till about the twenty-fifth year.

Each os innominatum articulates with its fellow of the opposite side (through the intervention of the *interosseous fibro-cartilage*, which unites the two surfaces of the pubic bones, see fig. II. f), with the sacrum, and with the femur (at the acetabulum). No less than thirty-five muscles are attached to this bone, some proceeding to the region of the back, others forming the walls of the abdomen, others forming the floor of the pelvis, others passing downwards to the lower extremities, &c. As the other

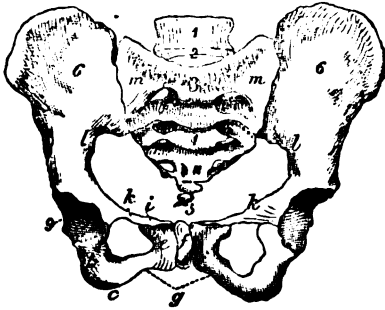


Fig. II.

Pelvis (with Fifth Lumbar Vertebra) of European Female Adult. Transverse diameter, 5.7; antero-posterior diameter, 4.5 inches.

1, the last lumbar vertebra; 2, the inter-vertebral substance connecting it with the sacrum; 3, the promontory of the sacrum; 4, its anterior surface; 5, the coccyx; 6, 6, the iliac fossae; 9, the acetabulum; c, the tuberosity, and d the body of the ischium; e, the os pubis; f, the symphysis pubis; g, the arch, i, the spine, and k the pectineal line of the pubis; k, l, k, l, the ilio-pectineal lines.—(From Humphry.)

bones entering into the formation of the pelvis, the sacrum, and the coccyx, belong essentially to the vertebral column, and will be described in the article on that subject, it is sufficient here to remark that, collectively, they form a triangular bony mass (with the base upwards, and with a concave anterior surface), which constitutes the posterior part of the pelvic ring. See fig. II. 4, 5.

The pelvis, considered as a whole, is divisible into a false and true pelvis. The *false pelvis* is all that expanded portion which is bounded laterally by the iliac bones, and lies above the prominent line termed the *linea ilio-pectinea* (see fig. II. k, l); while the *true pelvis* is all that part of the general pelvic cavity which is situated below that line. The broad, shallow cavity of the false pelvis serves to support the weight of the intestines; while the rectum, bladder, and part of the generative organs, lie in the cavity of the true pelvis. The upper aperture of the true pelvis is termed the *inlet*. It is somewhat

heart-shaped in form, and has three principal diameters—an *antero-posterior* (or *sacro-pubic*), which extends from the angle formed by the sacrum with the last lumbar vertebra to the symphysis pubis, or point of union of the two pubic bones; the *transverse*, at right angles to the former, and extending across the greatest width of the pelvis; and the *oblique*, extending from the sacro-iliac symphysis (or union), on one side, to the margin of the brim corresponding with the acetabulum on the other. The diameters of the outlet are two—an *antero-posterior*, extending from the tip of the coccyx to the lower part of the symphysis pubis; and a *transverse*, from the posterior part of one ischiatric tuberosity, to the same point on the opposite side. As the precise knowledge of the diameter and depth of the pelvis is of the greatest importance in the practice of midwifery, we give the average numbers representing the dimensions of a well-formed adult female pelvis. *Diameter of inlet or brim*—antero-posterior, 4.4 inches; transverse, 5.4 inches; oblique, 4.8 inches. *Diameter of outlet*—antero-posterior, 5 inches; transverse, 4.3 inches. *Depth of the true pelvis*—posteriorly, 4.5 inches; in the middle, 3.5 inches; anteriorly, 1.5 inches.

The pelvis is placed obliquely with regard to the trunk of the body; the plane of the inlet to the true pelvis forming an angle of from 60° to 65° with the horizon. According to Naegele (*Ueber das weibliche Becken*), the extremity of the coccyx is in the female, when standing upright, about seven lines higher than the lower edge of the symphysis pubis; the upper edge of the symphysis being at the same level as the lower edge of the second segment of the coccyx. By attention to these data, a detached pelvis may readily be placed at the angle at which it normally lies in the skeleton. The shape of the human pelvis is much affected by the curving forward of the lower part of the sacrum. This bend of the sacrum forward serves to support the viscera, when the body is in an erect posture; but it is of much more importance in its relation to the act of parturition. If all the antero-posterior diameters of the true pelvis from the brim to the outlet were bisected, the points of bisection would form a curved line, similar to the curve of the sacrum, and termed the *axis* of the pelvis. As the head of the child has to follow this curve, the difficulties of parturition are much greater than if the axis of the pelvis had been straight, as in the other vertebrata. Without entering into unnecessary details, we may remark generally, that the fetal head is of oval shape, with its greatest diameter from before backwards, and that in its passage through the pelvis it is so placed that its longest diameter at each stage of labour coincides with the longest diameter of the pelvis. The head enters the pelvis with the occiput (or back of the skull) being directed towards one ilium, and the face towards the other, while, at its final emergence, the face is turned towards the sacrum and coccyx. There can be no doubt that the screw-like or rotatory motion which is thus given to the fetal head, renders its passage through the pelvis more easy than it would otherwise have been.

There are well-marked differences, chiefly having reference to the act of parturition, between the male and female pelvis. In the female, the bones are lighter and more delicate than in the male, and the muscular impressions and eminences are less distinctly marked. The iliac fossae are large and expanded, and hence the great prominence of the hips. The several diameters (particularly the transverse diameter of the brim, which measures only 5.1 inches in the male) are somewhat greater; and the

to parliament. The chief towns are Haverfordwest, St Davids, Pembroke, and Tenby.

PEMMICAN. This was originally a North American Indian preparation only, but it was introduced into the British navy victualling-yards, in order to supply the arctic expeditions with an easily-preserved food, containing the largest amount of nutriment in the smallest space. As made by the Indians, it consists of the lean portions of venison dried by the sun or wind, and then pounded into a paste, and tightly pressed into cakes; sometimes a few fruits of *Amelanchier ovata* are added, to improve the flavour. It will keep for a very long time uninjured. That made for the arctic voyagers was chiefly of beef. In making pemmican, it is necessary to remove the fat completely.

PEMPHIGUS, or PO'MPHOLYX, belongs to that order of skin-diseases which is characterised by an eruption of large vesicles, filled with serous fluid, and known as *bullæ*. The disease occurs both in the acute and in the chronic form. In a mild case of acute pemphigus, bullæ, or blisters, from the size of a pea to that of a chestnut appear in succession (chiefly on the extremities), and having continued three or four days, break, form a thin scab, and soon heal, unaccompanied with febrile or inflammatory symptoms. In severe cases, there is considerable constitutional disturbance; the bullæ are larger, and the scabs heal with difficulty. The chronic form differs mainly from the acute by its prolonged continuance. The acute variety chiefly affects children, and has been ascribed to dentition, errors of diet, &c.; while the chronic form chiefly attacks aged persons, and is probably due to debility and impaired nutrition. The acute form usually requires nothing but cooling medicines and diet, and mild local dressings, such as simple cerate, to protect the raw surfaces from exposure to the air. In the chronic form, a nutritious diet, with the judicious use of tonics (iron, bark, &c.), is most commonly successful. In obstinate cases, arsenic is sometimes of use.

PEN, an instrument for writing with a fluid. In ancient times, a kind of reed (Lat. *Calamus*) was chiefly used, though sometimes the letters were painted with a fine hair-pencil, as among the Chinese at the present day. Quill-pens (see **QUILLS**) probably came into use after the introduction of modern paper. The English name pen is from Lat. *penna*, a feather; but the old form of *penna* was *pesna* or *petna* (= Gr. *peteron*), from the root *pet*, to fly; and just as Lat. *ped* is identical with Eng. *foot* (see letter F), so *petna* or *peteron* corresponds to *feather* (Ger. *feler*). During last century, many efforts were made to improve the quill-pen, the great defect of which was its speedy injury from use, and the consequent trouble of frequent mending; moreover, even the most skilful maker could not insure uniformity of quality, and any variation affected the writer's work. These efforts were chiefly directed to fitting small metal or even ruby points to the nib of the quill-pen; but the delicacy of fitting was so great, that but very little success attended the experiments. At the beginning of this century, pens began to be made wholly of metal; they consisted of a barrel of very thin steel, and were cut and slit so as to resemble the quill-pen as closely as possible. They were, however, very indifferent, and being dear (the retail price at first was half-a-crown, and subsequently sixpence), they made but little way; their chief fault was hardness, which produced a disagreeable scratching of the paper. In 1820, Mr Joseph Gillott, who dealt in the metal pens then made, hit upon an improvement, which,

by removing this great defect, gave a stimulus to the manufacture, which has caused it to be developed to an extent truly marvellous. This consisted in making three slits instead of the single one formerly used, and by this means much greater softness and flexibility were acquired. Mr Gillott also introduced machinery for the purpose of carrying out his improvements, and thereby so reduced the cost of production, that he was enabled to sell his improved pens in 1821 at £7, 4s. per gross, which was then considered a remarkable success. Better pens are now sold at twopence per gross by the same manufacturer; or, in other words, 864 pens for the same price as one pen in 1821. Nor is this to be wondered at, when we are acquainted with the wonderful ingenuity of the machinery by which it is effected. The lowest-priced pens are made almost entirely by machinery, but the better ones require much hand-labour for their completion; nevertheless, in the works of Mr Gillott alone, who is only one of several large manufacturers in Birmingham, the annual production is now nearly 150,000,000 pens, requiring a supply of five tons per week of the fine sheet-steel made for the purpose in Sheffield, a portion of which is returned as scrap or waste for re-manufacture. From Sheffield the steel is sent in sheets about eight feet long by three feet broad; it is prepared from the best iron, generally Swedish bloom. The manufacturer then prepares it by dipping for a short time in dilute sulphuric acid, which removes the scale or black surface; the acid itself is also carefully removed by immersion in clean water; the sheets are then passed backwards

and forwards through a rolling-mill with smooth rollers, which reduces the steel to the exact thickness required, and gives it greater compactness; it is next slit into strips of various widths according to the kind of pen to be made; for the ordinary kind its width is seen in fig. 1. This is then passed through a cutting-machine, which rapidly punches out pieces of the shape shewn in fig. 2, and in the order shewn in fig. 1, which is a portion of the strip with the pieces or blanks, as they are called, cut out; that which is represented is the waste or scrap previously referred to.

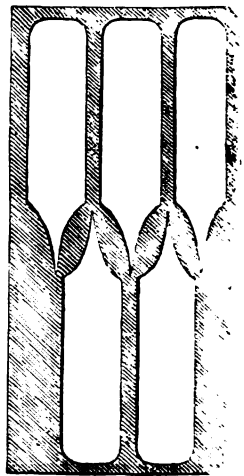


Fig. 1.

The blanks are now passed through a succession of operations, each conducted by a separate person: women or girls are chiefly employed. The first process is called *slitting*; they are passed one by one into a cutting-machine worked by a small hand-lever, which makes the two side slits, as seen in fig. 3. The second process, called *piercing*, is performed by a similar machine or hand-press, in which, however, only one punch acts, and that cuts out the small hole seen in fig. 4. The repeated rolling and stamping of the metal has by this time made it hard and brittle, and it is necessary to anneal it, for which purpose some thousands of the *slit* and *pierced* blanks are put into an iron box, and placed in the fire for a time, which softens them considerably; this is the third process. When cold, another operator receives them, and with

may set the law in motion. Accordingly, not only may anybody in general sue for the penalty, but an inducement is offered by declaring the party who does so to be entitled to the whole or a half of the penalty. Without such inducement, many offences would be unpunished. The party who so sues is generally called the informer. Thus, in offences against the game laws, anybody may sue for the penalty, and he is entitled to half of it. Sometimes the penalty can only be sued for in the superior courts of law; but in the great majority of instances, the enforcing of penalties is part of the administration of justice before justices of the peace. It is for the justices to fix the amount if they have (as they generally have) a discretion to do so. If it is not paid, the justices may issue a distress-warrant, authorising a constable to seize and sell the goods of the party to pay the fine; and if there are no goods, then the justices may commit the party to prison as a substitutionary punishment. Sometimes justices have a discretion either to impose a penalty or commit the party to prison as an alternative punishment. All these matters depend on the construction of particular statutes.

PENANCE (Lat. *penitentia*), in Roman Catholic theology, means the voluntary or accepted self-inflicted punishment by which a repentant sinner manifests his sorrow for sin, and seeks to atone for the sin, and to avert the punishment which, even after the guilt has been remitted, may still remain due to the offence. Penance is believed in the Roman Catholic Church to be one of the sacraments of the New Law. It will be necessary to explain it briefly both under its relations as a sacrament, and as a private personal exercise.

Penance must be carefully distinguished from repentance, which is simply sorrow for evil-doing, accompanied with a purpose of amendment. Penance is the fruit or the manifestation of this sorrow, and it is commonly accompanied or expressed by some of those external acts which are the natural manifestations of any deep sorrow, either negative, as the neglect of ordinary attention to dress, to the care of the person, to the use of food; or positive, as the direct acts of personal mortification and self-inflicted pain, such as fasting, wearing haircloth, strewing the head with ashes, watching of nights, sleeping hard, &c. Such manifestations of sorrow, whether from motives of religion or from merely natural causes, are common among the eastern races, and are frequently alluded to in the Scripture. In the personal practice of the early Christians, penance found a prominent place, and the chief and acknowledged object of the stated Fasts (q. v.), and other works of mortification which prevailed, was that of penitential correction, or of the manifestation of sorrow for sin.

A still more striking use of penance, however, in the early church, was the disciplinary one; and this, in the Roman Catholic view, is connected with the sacramental character of penance. Any discussion of this purely theological question would be out of place here, and it will be enough to state briefly that Roman Catholics number penance among the Seven Sacraments (q. v.), and believe it to be of direct divine institution (Matt. xvi. 19, xviii. 18; John xx. 21). The matter of this sacrament consists, in their view, of the three acts of the penitent—contrition, or heartfelt sorrow for sin, as being an offence against God; confession, or detailed accusation of one's self to a priest approved for the purpose; and satisfaction, or the acceptance and accomplishment of certain penitential works, in atonement of the sin confessed; and the form of the sacrament is the sentence of absolution from

sin pronounced by the priest who has received the confession, and has been satisfied of the penitential disposition of the self-accusing sinner. In all these points, of course, they are at issue with Protestants. Even in the apostolic times, the practice prevailed of excluding persons of scandalous life from the spiritual fellowship of the Christian community (see EXCOMMUNICATION); and without attempting to fix the date, it may be stated as certain, from the authority of Tertullian and other writers, that from a very early time the persons so excluded were subjected to certain penitential regulations. The class of offenders so treated were those who had been notoriously guilty of the grievous crimes of idolatry or apostasy, murder, adultery, and other scandalous offences. The period of penitential probation differed in different times and places, but in general was graduated according to the enormity of the sin, some going so far in their rigour (see NOVATIAN) as, contrary to the clearly-expressed sense of the church, to carry it even beyond the grave. In the earlier ages, much depended upon the spirit of each particular church or country; but about the 4th c., the public penitential discipline assumed a settled form, which, especially as established in the Greek Church, is so curious that it deserves to be briefly described. Sinners of the classes already referred to had their names enrolled, and were (in some churches, after having made a preliminary confession to a priest appointed for the purpose) admitted, with a blessing and other ceremonial, by the bishop to the rank of penitents. This enrolment appears to have commonly taken place on the first day of Lent. The penitents so enrolled were arranged in four grades, called—1. (Gr. *prosklaíontes*, Lat. *stentes*) 'Weepers'; 2. (Gr. *akroómēnoi*, Lat. *audientes*) 'Hearers'; 3. (Gr. *hypopiptōntes*, Lat. *prosternentes*) 'Prostraters'; 4. (Gr. *εὐσταῖες*, Lat. *consistentes*) 'Standers.' Of these classes, the first were obliged to remain outside of the church at the time of public worship, and to ask the prayers of the faithful as they entered. The second were permitted to enter and to remain in the place and during the time appointed for the Catechumens (q. v.); but, like them, were required to depart before the commencement of the solemn part of the Liturgy (q. v.). The third were permitted to pray with the rest, but kneeling or prostrate, and for them were prescribed many other acts of mortification. The fourth were permitted to pray with the rest in a standing posture, although apparently in a distinct part of the church; but they were excluded from making offerings with the rest, and still more from receiving the communion. The time to be spent in each of these grades at first differed very much according to times and circumstances, but was afterwards regulated by elaborate laws, called penitential canons. Still it was in the power of the bishop to abridge or to prolong it; a power, the exercise of which is connected with the historical origin of the practice of Indulgence (q. v.). Of these four grades, the first two hardly appear in the Western Church. It is a subject of controversy whether, and how far, this discipline was extended to other than public sinners; but it seems certain that individuals, not publicly known as sinners, voluntarily enrolled themselves among the penitents. All four grades wore a distinguishing penitential dress, in which they appeared on all occasions of public worship, and were obliged to observe certain rules of life, to renounce certain indulgences and luxuries, and to practise certain austerities. In some churches, they were employed in the care of the sick, the burial of the dead, and other of the more laborious works of charity. The penitent, in

so that, collectively, the whole shall form a beautifully smooth cone, the apex of which is a sharp point. Black-lead pencils are made of graphite or plumbago, which contains no lead whatever in its composition, but is in reality almost pure carbon. See **BLACK-LEAD**. The misnomer is probably owing to the fact, that, previous to the employment of graphite for making pencils, common lead was used, and this was the case even within the present century. Consequently, as the plumbago, with its black streak, offered a contrast to the pale one of the lead, it was called in contradistinction *black-lead*.

The best graphite for drawing-pencils is found in the Cumberland mines, which have long been celebrated. Within the last three years, however, vast deposits of this mineral, of a very fine quality, have been discovered in Siberia and other parts of the Russian empire. Inferior qualities are found in Austria and Prussia, in Ceylon, and various parts of North America; but they are rarely used in pencil-making, except for very inferior kinds. Black-lead is rarely sufficiently free from sand and other foreign ingredients to be used without preparation; it is therefore generally ground fine, and levigated or washed until it is pure, and again formed into solid blocks by means of enormous pressure, generally in hydraulic presses; these blocks are then sawn into thin plates about the sixteenth of an inch in thickness, which are again cut across, so as to form them into small square sticks.

It may appear a very simple process to press the powdered graphite into blocks, but it was found so difficult in practice as almost to prevent the employment of this method, which has led to immense improvement in pencil-making. It was found at first that the difficulty of pressing out the contained air was so great that the presses were broken under the weight required; pressure in a vacuum was then tried, but the difficulty of applying it was found almost insurmountable, and it was certainly unprofitable. Mr Brokedon of London, who has long been famous for his pencils, at last surmounted the difficulty by an ingenious and very simple process. This consists in compressing the black-lead into blocks two or three inches square, with only moderate pressure; these are then coated over with paper, well glued, so that, when dry, the covering is air-tight. A small hole is now made through this coating on one side, and several of these cubes of black-lead are put under the receiver of an air-pump, and the air being exhausted completely from them, the orifice in each is closed by an adhesive wafer, which prevents the return of the air when they are taken out of the receiver. They are next placed under the hydraulic press, and a well-sustained and regular pressure is brought to bear upon them for twenty-four hours, after which they are found to be so completely consolidated, that in cutting them the substance is equal in density to the best specimens of unprepared graphite. There is so large a variation in the colour of various qualities of black-lead, that, by a judicious mixture of them, when in the powdered state, almost any shade of darkness can be procured; but instead of thus carefully combining different qualities of graphite, it is a common practice to add sulphur or sulphuret of antimony, and by heating to procure the desired degree of blackness. For very inferior pencils, the worst quality of black-lead is mixed with black chalk and size, or gum-water, and formed into a paste, of which the pencil is made.

It is usual to enclose the material constituting the essential part of the pencil in a case of wood, for

its protection from breakage, and to prevent its soiling the hands. The wood (generally cedar) is first sawn into thin boards, about half the thickness of the intended pencils; these are then cut into small pieces about ten inches long, by six in width, which are placed in the cutting and grooving machine. This machine consists principally of two circular saws—one very thin, and so set that it will cut through the board; the other revolving within the eighth of an inch of it, so set as only to cut a fine square groove in the wood. By means of this machine, the little boards are cut into straight square sticks, each having a groove on one surface. Into these grooves, the little prepared sticks of black-lead are laid and covered with a similar piece of wood, but not grooved. A workman, who is called the 'fastener-up,' having glued the inner faces of the two pieces of wood, presses them together, and sets them to dry; after which they are passed through the rounding-machine, dressed with a semi-circular smoothing-plane, cut at the ends, and then polished by rubbing them with a piece of shark-skin. The last process is stamping; them with the maker's name and the letter which designates their peculiar quality. These letters are H, HH, HHH, B, BB, BBB, HB, FS. H signifies *hard*; repeated twice and thrice, it means *harder* and *very hard*. B means *black*, HB *hard and black*, and so on. FS signifies *fine stroke*.

Chalk-pencils are made in a similar manner, only that finely-powdered coloured chalks, such as are used for crayons, are substituted for the black-lead. Previous to pressing and cutting the chalk, it is mixed with a little hot melted wax, which gives it softness and adhesiveness.

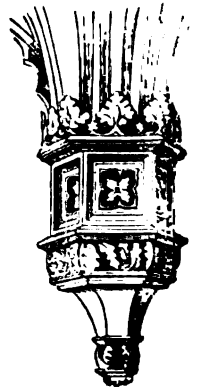
Slate-pencils for writing on slate are made either by cutting slate into thin sticks, and rounding them, or by cutting it into fine square slips, and encasing them in wood, as in the case of black-lead, &c

PENDANT, or **PENNANT**, is a narrow flag of great length, tapering to a point, and carried at the head of the principal mast in a royal ship, to shew that she is in commission. In the British navy, the pendants are borne of three colours—red, white, or blue—according to the colour to which the admiral commanding the fleet pertains. See **FLAG-OFFICER**. A *broad-pennant* is a blue pennant, shorter and broader than the above, carried at the mast-head of a commodore's ship, to denote that her captain is the commodore on the station. A first-class commodore hoists his broad-pennant at the fore; if of the second-class, his flag flies at the mizzen.

The *rudder-pendants* are strong ropes spliced in the rings of the rudder-chain, to prevent the loss of the rudder, should it by any accident become unshipped.

PENDANT, a hanging ornament, used in ceilings, vaults, staircases, timber-rooms, &c. It is sometimes a simple ball, and sometimes elaborately ornamented, and is chiefly used in the later Gothic and Elizabethan styles.

PENDENTIVE, the portion of a vault resting on one pier, and extending from the springing to the apex.—The word *pendentive* is also applied to



Pendant.

places. Fracturally, it gives the kinetic measurement of gravity, which is not only by far the most convenient, but also the true measure. By this application of the pendulum, the oblateness of the earth has been determined, in terms of the law of decrease of gravity from the poles to the equator. The instrument has also been employed to determine the mean density of the earth (from which its mass is directly derivable), by the observation of its times of vibration at the mouth and at the bottom of a coal-pit. It was shewn by Newton, that the force of attraction at the bottom of a pit depends only upon the internal nucleus which remains when a shell, everywhere of thickness equal to the depth of the pit, has been supposed to be removed from the whole surface of the earth. The latest observations by this method were made by Airy, the present astronomer-royal, in the Harton coal-pit, and gave for the mean density of the earth a result nearly equivalent to that deduced by Cavendish and Maskelyne from experiments of a totally different nature. See EARTH.

If the bob of the simple pendulum be slightly displaced in any manner, it describes an ellipse about its lowest position as centre. This ellipse may, of course, become a straight line or a circle, as in the cases already considered. The bob does not accurately describe the same curve in successive revolutions; in fact, the elliptic orbit just mentioned rotates in its own plane about its centre, in the same direction as the bob moves, with an angular velocity nearly proportional to the area of the ellipse. This is an interesting case of *progression of the apse* (Apsides, q. v.), which can be watched by any one who will attach a small bullet to a fine thread; or, still better, attach to the lower end of a long string fixed to the ceiling a funnel full of fine sand or ink which is allowed to escape from a small orifice. By this process, a more or less permanent trace of the motion of the pendulum is recorded, by which the elliptic form of the path and the phenomena of progression are well shewn.

According to what is stated above, there ought to be no progression if the pendulum could be made to vibrate simply in a straight line, as then the area of its elliptic orbit vanishes. It is, however, found to be almost impossible in practice to render the path absolutely straight; so that there always is from this cause a slight rate of change in the position of the line of oscillation. But as the direction of this change depends on the direction of rotation in the ellipse, it is as likely to affect the motion in one way as in the opposite, and is thus easily separable from the very curious result obtained by Foucault, that on account of the earth's rotation, the plane of vibration of the pendulum *appears to turn* in the same direction as the sun, that is, in the opposite direction to the earth's rotation about its axis. To illustrate this now well-known case, consider for a moment a simple pendulum vibrating at the *pole* of the earth. Here, if the pendulum vibrates in a straight line, the direction of that line remains absolutely fixed in space, while the earth turns round below it once in 24 hours. To a spectator on the earth, it appears, of course, as if the plane of motion of the pendulum were turning once round in 24 hours, but in the opposite direction. To find the amount of the corresponding phenomenon in any other latitude, all that is required is to know the rate of the earth's rotation about the vertical in that latitude. This is easy, for velocities of rotation are resolved and compounded by the same process as forces, hence the rate at which the earth rotates about the vertical in latitude λ is less than that of rotation about the polar axis in the ratio of $\sin \lambda$

to 1. Hence the time of the apparent rotation of the plane of the pendulum's motion is $\frac{24 \text{ hours}}{\sin \lambda}$. At

the pole, this is simply 24 hours; at the equator, it is infinitely great, or there is no effect of this kind; in the latitude of Edinburgh ($56^\circ 57' 23.2''$), it is 28.63 h., or 28 h. 37 m. 48 s.

We have not yet alluded to the obvious fact, that a *simple* pendulum, such as we have described above, exists in theory only, since we cannot procure either a single heavy particle, or a perfectly light and flexible string. But it is easily shewn, although the process cannot be given here, that a rigid body of any form whatever vibrates about an axis under the action of gravity, according to the same law as the hypothetical simple pendulum. The length of the equivalent simple pendulum depends upon what is called the Radius of Gyration (q. v.) of the pendulous body. Its property is simply this, that if the whole mass of the body were collected at a point whose distance from the axis is the radius of gyration, the moment (q. v.) of inertia of this heavy point (about the axis) would be the same as that of the complex body. The square of the radius of gyration of a body about any axis, is greater than the square of the radius of gyration about a parallel axis through the centre of gravity, by the square of the distance between those lines. Now, the length of the simple pendulum equivalent to a body oscillating about any axis is directly as the square of the radius of gyration, and inversely as the distance of the centre of gravity from the axis. Hence, if k be the radius of gyration of a body about an axis through the centre of gravity, $\sqrt{k^2 + h^2}$ is that about a parallel axis whose distance from the first is h ; and the length, l , of the equivalent simple pendulum is $l = \frac{k^2 + h^2}{h}$.

This expression becomes infinitely great if h be very large, and also if h be very small (that is, a body vibrates very slowly about an axis either far from, or near to, its centre of gravity). It must therefore have a minimum value. By solving the equation above as a quadratic in h , we find that l cannot be less than $2k$, which is, therefore, the length of the simple pendulum corresponding to the quickest vibrations which the body can execute about any axis parallel to the given one. In this case, the value of h is equal to k . Hence, if a circular cylinder be described in a body, its axis passing through the centre of gravity, and its radius being the radius of gyration about the axis, the times of oscillation about all generating lines of this cylinder are equal, and less than the times of oscillation about any other axes parallel to the given one. Also, since the formula for l , above given, may be thus written, $h(l - h) = k^2$, it is obvious that it is satisfied if $l - h$ be put for h . Hence, if any value l (of course not less than $2k$) be assigned as the length of the equivalent simple pendulum, there are *two* values of h which will satisfy the conditions; that is, there are two concentric cylinders, about a generating line of either of which the time of oscillation is that of the assigned simple pendulum. When $l = 2k$, these cylinders coincide, and form that above described. And, since the sum of the radii of these cylinders is l , it is obvious that if we can find experimentally two parallel axes about which a body oscillates in equal times, and if the centre of gravity of the body lie between these axes, and in their plane, the distance between these axes is the length of the equivalent simple pendulum. This result is of very great importance, because it enabled Kater (who was the first to employ it) to use the complex pendulum for the determination of the length of the simple

form; the neck of moderate length; the head small; the bill moderately long, straight, more or less compressed; the tail very short. Some of them have a long, slender, and pointed bill, the upper mandible a little curved at the tip, and

the idea of loneliness and desolation more powerfully than if there were a total absence of life. When attacked, however, they often show courage in self-defence, and are ready to run with open bill at an invader. The young are reckoned good eaters; the old are said to be black and tough. The name *P.* is said to be derived from the Latin *pinguis*, fat.—Penguins make no nest, but lay a single egg in a chosen place on the shore; and the egg is carefully tended both by male and female. The female *P.* keeps charge of her young for nearly twelve months.—Many of the penguins are birds of bright plumage.—Cuttlefish, and other *Cephalopoda*, form a great part of their food. Their voice is loud and harsh, between a quack and a bray, but there are many diversities in the different species.

PENICILLARIA. See GUINEA CORN and MILLET.

PENITENTIAL PSALMS, seven of the Psalms of David, so called as being specially expressive of sorrow for sin, and accepted by Christian devotion as forms of prayer suitable for the repentant sinner. They are Psalms vi., xxxii., xxxviii., li., cii., cxxx., and cxlii. according to the Authorised Version, which correspond with vi., xxxi., xxxvii., l., ci., cxli., and cxlii. of the Vulgate. These Psalms have been set apart from a very early period, and are referred to as such by Origen (Hom. ii. in Leviticum). Pope Innocent III. ordered that they should be recited in Lent. They have a special place in the Roman Breviary, and more than one of the popes attached an indulgence to the recital of them. The most deeply penitential, and the most frequent in use, both public and private, is the 51st Psalm, or the *Miserere* (50th in the Vulgate).

PENITENTIARIES, strictly so called, are institutions for the reception of penitent women, in which confinement is purely voluntary. The name has also been applied to prisons under the separate system, having been adopted by the Quakers of Pennsylvania in 1786, when they caused the legislature of that state to abolish the punishments of death, mutilation, and the whip, and to substitute solitary confinement as a reformatory process. Of penitentiaries, in the first sense, there are 63 in Great Britain and Ireland, capable of receiving 2657 inmates, besides numerous small private 'Homes.' The single condition of admission to most of the institutions is 'penitence,' a desire and endeavour to return to a virtuous life. The inmates remain in the strictest seclusion for periods varying from a few months to two years, the average time being about a year; they then return to their friends, or to situations provided for them. It is an invariable rule not to dismiss any one without seeing that she is provided with the means of honest subsistence. During their seclusion they are employed in needlework, washing, and housework. The ages at which they are received vary from 14 to 40. In the metropolis there are 19 institutions, accommodating 1155 women; in other towns of England, 34 institutions, accommodating 1116; and in the chief towns of Scotland and Ireland, 10 institutions, with accommodation for 386. One third of the provincial, and one half of the metropolitan establishments have been created in the last ten years. The oldest institution in existence is the London Magdalen Hospital, opened in 1759; the next, that of Dublin, 1767; Edinburgh follows in 1797; and none of the others date earlier than the present century. The results of these penitentiaries, as far as they can be ascertained, are excellent. During the last 100 years, 8983 women have passed through the London Magdalen, and the omnibus

Penguin (*Aptenodytes pennatis*).

feathered for about a third of its length; some, sometimes called Gorfews or Gorfous (*Chrysocoma*) have a stout and pointed bill, a little curved at the tip; some, Sphenisques or Spheniscans (*Spheniscus*), have a straight and compressed bill, irregularly furrowed at the base. The Penguins are all among the most aquatic birds, although they are seldom seen very far out at sea; but it is only in the breeding season that they spend much time on shore. They are found only in the southern hemisphere, and chiefly in high southern latitudes, although some of the species extend into warm regions, as *Spheniscus Humboldtii* to the coast of Peru. Of this species, which is called *Pazaro niño*, or Child Bird, by the Peruvians, Tschudi states that it is easily tamed, becomes very sociable, and follows its master like a dog, waddling along in a very amusing manner with its plump body and short legs, keeping its balance by motions of its little wings. It displays considerable intelligence, and learns to answer to its name. In some of the furthest antarctic regions, penguins are prodigiously numerous, appearing on the shore like regiments of soldiers, or, according to another similitude which has been used by a voyager, like bands of little children in white aprons. They often occupy for their breeding ground a space of several acres, which is laid out and levelled and divided into squares, as nicely as if it had been done by a surveyor; whilst between the compartments they march as accurately as soldiers on parade. The KING P. (*A. Patagonica*), a large species, of the size of the great auk, dark grayish-blue above, white beneath, with a black head and a yellow curved band on the throat, is found in such numbers on some of the sandy antarctic coasts, that Mr Bennett describes one breeding ground on Macquarie Island as covering thirty or forty acres, and, to give some notion of the multitudes, speaks of 30,000 or 40,000 birds as continually landing and as many putting to sea. On many of the antarctic shores, the penguins do not flee from nor seem to dread the presence of man, remaining as if stupidly indifferent, even when their companions are knocked on the head; their very indifference, it is said, suggesting

Orange as William III., P. was twice accused of treason, and of corresponding with the exiled monarch, but was acquitted. In 1690 he was arrested on a charge of conspiracy, but was again acquitted. Nevertheless, in the following year, the charge was renewed. Nothing appears to have been done for some time, but P. at last, through the kindly offices of his friends, Locke, Tillotson, and others, had the matter thoroughly investigated, and he was finally and honourably acquitted, November 1693. Shortly after, his wife died, but in less than two years he married again. His second wife, Hannah Callowhill, was a Bristol lady. In 1699 he paid a second visit to the New World, and found Pennsylvania in a prosperous condition. His stay, which lasted two years, was marked by many useful measures, and by efforts to ameliorate the condition both of the Indians and Negroes. P. departed for England towards the end of 1701, leaving the management of his affairs to a Quaker agent named Ford, whose villany virtually ruined Penn. When the rogue died, he left to his widow and son false claims against his master, and these were so ruthlessly pressed, that P. allowed himself to be thrown into the Fleet in 1708, to avoid extortion. His friends afterwards procured his release, but not till his constitution was fatally impaired. P. died at Ruscombe, in Berkshire, July 30, 1718. He left issue by both marriages. Upon the P. controversy it is unnecessary further to enter. We refer our readers to Macaulay's *History of England* (1849—1855); Hepworth Dixon's *Life of Penn* (new edit. 1856); J. Paget's *Inquiry into the Evidence of the Charges brought by Lord Macaulay against William Penn* (Edin. 1858).

PENNALISM, the name given to a practice once prevalent in the Protestant universities of Germany, which seems to have been essentially the same as the Fagging (q. v.) of the English public schools. The freshmen or students of the first year (called *pennals*—i. e., *pen-cares*; fags) were considered by the elder students ('schorists') as virtually their servants. Whatever property the pennals had they must give up to the schorists, who now employed them in the meanest offices, made laughing-stocks of them, and beat and ill-used them—all which had to be endured without complaint. After a year of this discipline followed the ceremony of 'deposition'—a practice older than pennalism itself, and borrowed probably from knightly consecration—in which the pennal underwent a number of symbolical trials, indicative generally of purgation from impurity and consecration to an intellectual life. Pennalism is said to have been introduced in the beginning of the 17th c., and to have been mostly confined to the Protestant universities of Germany. But although the full development of the system may have been thus restricted, germs and modifications of it were much earlier and more general, as is manifest from the prevalence of names of contempt for first year's students (see BEJAN), and from statutes passed by French universities as early as the middle of the 14th c., against levying payments for first footing from them. See also FAGGING. The servitude imposed on the pennals was probably an aping of the usage of chivalry, by which a candidate for knighthood had to serve for a time as page to one already a knight. All attempts to check the evils of pennalism were long unavailing, as the pennals took part with the schorists in resisting all regulations of the authorities, which would have deprived them of the hope of exercising in their turn a like tyranny upon others. Edicts against the practice were issued in Jena and other universities about the beginning of

the 17th c., but it was not till the last half of the century that the universities, by uniting in severe measures, were able to check the evil; and traces of it survived for a long time afterwards. In imitation of the students, a kind of pennalism was adopted by other bodies, more particularly by the printers, who retained the ceremony of 'deposition' after it had disappeared from the universities—Schöttgen, *Historie des Pennalwesens* (Dread. 1747).

PENNANT, THOMAS, LL.D., tourist, naturalist, and antiquary, was born June 14, 1726, at Downing, in Flintshire, and educated at Queen's and Oriel Colleges, Oxford. His first important publication was the *British Zoology* (1761—1769), which contained in all 132 plates on imperial paper, engraved by Mazel, and established his reputation. While the work was in course of publication, P. made a trip to the continent, and saw some of the scientific and literary celebrities of the time, as Buffon, who has favourably mentioned him in his great work on *Natural History*, Voltaire, Haller, the two Geauers, and Pallas. In 1769, he made the first of his famous tours in Scotland, penetrating to the remotest part of the country, which, he says, was then 'almost as little known as Kamtschatka.' He returned with a very good opinion of it, and published his report in 1771, in consequence of which (according to him) Scotland has 'ever since been inondée with southern visitants.' The year before, he added 103 plates to his *British Zoology*, with descriptive notices; and in 1771, printed at Chester his *Synopsis of Quadrupeds*, subsequently enlarged and improved, under the title of *History of Quadrupeds*. Of this work Cuvier says: 'It is still indispensable to those who wish to study the history of quadrupeds.' In the same year the university of Oxford conferred on him the degree of LL.D. Next year he undertook his second and most important tour in Scotland, which included a voyage to the Hebrides (an account of which appeared in 3 vols. 1775). P. was warmly welcomed by the inhabitants. Almost every incorporated town paid him some formal compliment, and he returned 'rich in civic honour.' In 1773, he published his *Genera of Birds*, and made an antiquarian tour through the north of England. His subsequent tours through Wales do not require special notice. In 1777 appeared a fourth volume of his *British Zoology*, containing the Vermes, the Crustaceans and the Testaceous Animals of the Country. Among a great variety of later miscellaneous publications, we may mention in particular an amusing life of himself (*The Literary Life of the late Thomas Pennant, Esq., by himself*, 1793). He died December 16, 1798.

PENNATULA, a genus of zoophytes (*Anthozoa*), allied to *Gorgonia* (q. v.) and *Alcyonium* (q. v.), and having very similar polypes; but the polype mass is not fixed by its base, has a fleshy stem strengthened by a bone, and a skin containing calcareous spicules, the upper part of the stem winged on two sides, with numerous pinnae, along the upper margins of which the polype-cells are ranged. The whole form somewhat resembles a quill, so that the popular name SEA PEN is very often given to these zoophytes. One species, *P. phosphorea*, is common on the northern parts of the British coast. It is from two to four inches in length, of a purplish-red colour, and like many—perhaps all—of the other species, is sometimes brilliantly phosphorescent, emitting flashes of light when disturbed, but ceasing to be luminous on relapsing into quiescence. The stalk is hollow in the centre, and the bone which it contains—and which is composed of phosphate and carbonate of lime, like the bones of the vertebrate animals—is a very remarkable part of its

structure, not extending the whole length of the stalk, slender, straight, and perfectly simple, but bent backwards at each end into a hook. Other species are found in the Mediterranean and other seas, some of them more pen-like than even the

Pennatula (Virgularia mirabilis).

British one. It has been alleged that they swim by contractions and dilatations of their common fleshy substance, or by movements of the pinnæ; but there is no good evidence of their possessing any such power of locomotion, which is very contrary to the analogy of all similar zoophytes, and more probably the opinion prevalent among the fishermen of the Scottish coasts is the correct one, that their natural place is at the bottom of the sea, with the somewhat flexible lower end of the stalk immersed in mud. Nearly allied to the pennatula is another genus of extremely beautiful zoophytes, *Virgularia*, ranked with them in the family *Pennatulidæ*, and sometimes receiving the popular name

SEA RUSH. One species, *V. mirabilis*, is found on the British coasts. It resembles a slender rod, bearing throughout the greater part of its length two rows of lobes, along the margin of which the polypus are arranged. The whole length is from six to ten inches.



Pennon.

for the charge. The accompanying example is from the brass to Sir John D'Aubernon at Stoke D'Aubernon, Surrey; it is azure, charged with a chevron and fringed gules.

PENNONCELLE, a long streamer-like flag, the diminutive of the Pennon (q. v.).

PENNSYLVANIA, one of the thirteen original United States of America, now the second in population, and called from its position and importance 'the Keystone State,' is in lat. 39° 43'—42° 18' N., long. 74° 75'—80° 37' W. It is bounded N. by Lake Erie and New York; E. by New York and New Jersey, from which it is separated by the Delaware River; S. by Maryland and Virginia; and W. by Virginia and Ohio. The small state of Delaware borders for a few miles on its south-eastern angle. The form is very regular, the boundaries of three times being lines of latitude and longitude. It is 310 miles long, 160 wide, containing an area of 66,000 square miles, or 29,440,000 acres, divided into 66 counties. The state is divided near the middle by the Alleghenies into an eastern region, whose

waters fall into the Delaware and Chesapeake Bays, and a western, in which the principal rivers are the Allegheny, the Monongahela, and other important affluents of the Ohio. These, with the Delaware and Susquehanna, Lehigh, Schuylkill, and Juniatta, are the principal rivers. The chief towns are Philadelphia, on its south-eastern border; Pittsburgh, at the head of the Ohio; and Harrisburgh, the capital, on the Susquehanna. The Blue Ridge, which enters the south-eastern portion of the state, rises to the height of 1500 feet; the passes of the Alleghenies are 2000 feet high, and single peaks 3000 feet. Lake Erie is 850 feet above the ocean. The geological formations range from the Potomac sandstone to the coal-measures. There is middle secondary red sandstone and drift in the north-east; gneiss and red sandstone in the south-east; the centre of the state is a rich and fertile limestone valley. Near Philadelphia are fine quarries of white marble. The great anthracite and semi-anthracite deposits of coal are east of the Alleghenies; west are the great beds of bituminous coal, which largely supply the Mississippi valley. Salt is found beneath the coal, and in the bituminous districts great deposits of petroleum. Adjacent to the coal-measures are rich beds of iron ore, also lead, copper, nickel, and chrome ores. The climate is mild, and the soil fertile, producing abundance of wheat, Indian corn, oats, rye, buckwheat, potatoes, flax, hemp, tobacco, hay and pasturage, with apples, pears, peaches, grapes, &c. While one of the best agricultural states, P. has also a large industry engaged in mines and manufactures, coal, iron, woollen, and cotton. The state has more than 3000 miles of railways, 1030 of canals, 26 colleges, 8 schools of medicine, 20 state academies, 335 public schools, having 14,000 teachers and 647,414 pupils, 4000 churches, 400 public and school libraries, 310 periodicals—of which 27 are daily papers, and 71 literary publications—2 state penitentiaries at Philadelphia and Pittsburg on the solitary system, asylums for insane, blind, &c., Girard College for orphan boys. In 1627 a colony of Swedes and Finns settled on the river Delaware. In 1681 the territory was granted by Charles II. to William Penn, who, by the industry of his co-religionists, the Society of Friends, by cultivating peace with the Indians and encouraging emigration, founded a rich and flourishing state. It was the scene of Braddock's defeat in the French war; and in the revolution of 1776, Philadelphia was the chief city and capital of the Federation, near which were the actions of Germantown, Brandywine, &c. The population, largely Scottish and German in its origin, was in 1800, 602,361; 1820, 1,049,458; 1840, 1,724,033; 1860, 2,906,370.

PENNY, a British coin and money of account. After the Scotch (q. v.) it is the most ancient of the English coins, and was the only one generally current among the Anglo-Saxons. The name is evidently the same as the German *pennig*, and both words seem to be intimately connected with the old German *pfand*, a pledge, and the Latin *pendo*, to weigh or to pay. Both in Britain and on the continent the word was anciently used for money in general, hence we have such phrases as, 'he has got his penny-worth,' i. e., he has got value for his money, &c. The penny is first mentioned in the laws of Ina, king of the West Saxons, about the close of the 7th century. It was at this time a silver coin, and weighed about 22½ troy grains, being thus about 1/24th of the Saxon pound-weight. This relation to the pound-weight is evidently derived from the usage of the early Franks, who retained the Roman division of the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii*

PENNYROYAL—PENSIONS AND PENSIONERS.

(the denarius being thus the 240th part of the libra or pound. See MARK. Halfpence and farthings were not coined in England till the time of Edward I., but the practice previously prevailed of so deeply indenting the penny with a cross mark, that the coin could be easily broken into two or four parts as required. Silver farthings ceased to be coined under Edward VI., and silver halfpennies under the Commonwealth. By this time the penny had steadily decreased in weight; it was 18 grains under Edward III., 15 and 12 under Edward IV., 8 under Edward VI., and under Elizabeth it was finally fixed at $7\frac{1}{2}$ grains, or $\frac{1}{4}$ of an ounce of silver, a value to which the subsequent copper pennies, which till 1860 were the circulating medium, closely approximated. In 1672 an authorised copper coinage was established, and halfpence and farthings were struck in copper. The penny was not introduced till 1797, and at the same period the coinage of twopenny pieces was begun; but these latter, being found unsuitable, were withdrawn. The penny of the present bronze coinage is of only about half the value of the old copper penny. The German *pfennig* was also originally a silver coin, bearing the same relation to the German pound of silver as the English penny to its pound. And in the 12th c. it was made so broad, in imitation of the Byzantine coins, that it would no longer bear to be struck with a die on each side as before, but was struck on one side only. In the beginning of the 14th c. the mark of silver was anew divided into 60 parts or coins, which, to distinguish them from the old coins, were called *grossi denarii*, whence the term *groschen*. In the modern money system of Prussia, the *pfennig* is a copper coin, the twelfth part of a *groschen*.

PENNYROYAL, a species of Mint (q. v.). The name P. is given in North America to a small plant, *Hedeoma pulegioides*, allied to the mints, and having,

in Scotland, at which the invited guests made contributions in money (seldom more than 1s. each), to pay the general expenses, and leave over a small sum, which would assist the newly-married pair in furnishing their dwelling. This practice, now disused, was prevalent in the 17th c.; and, as leading to 'profane minstrelsing and promiscuous dancing,' was denounced by an Act of the General Assembly of the Kirk, 1645, as well as by numerous acts of presbyteries and kirk-sessions about the same period.

PENOBSCOT, a river of Maine, U.S., rises near the centre of the state by two branches, from a chain of lakes extending north-westerly; and after a south by west course of 135 miles from the junction, or 275 in all, empties into Penobscot Bay, a broad and sheltered opening into the Atlantic Ocean, 20 miles wide, with several large islands. Its chief towns are Belfast, at its mouth; Bangor, 50 miles above, where falls supply power to saw-mills and factories; Castine, and Bucksport. It is navigable to Bangor, where there is a tide of 20 feet. The chief trade is pine timber.

PENRITH, a market town of Cumberland, in a picturesque and fertile valley, with rich and striking scenery in the vicinity, stands on the Carlisle and Lancaster Railway, 17 miles south-south-east of Carlisle. In the parish churchyard is a monument of great antiquity, formed of two pyramidal stones about 12 feet high, and known as the 'Giant's Grave.' The town contains an ancient free grammar-school, and other educational institutions. A new and beautiful church, built in the style of the 13th c., was consecrated here in 1850. Cotton, linen, and woollen goods are manufactured. Pop. (1861) 7189.

PENRYN, a municipal and parliamentary borough and market town of England, in the county of Cornwall, in a warm, sheltered, and richly productive valley, on the Plymouth and Falmouth Railway, two miles west-north-west of Falmouth. It stands on a low hill projecting eastward into Falmouth Harbour. Trade is carried on to some extent with the mining district of Redruth, and there are several quarries in the vicinity, from which the famous P. granite—the material of which Waterloo Bridge, the Chatham Docks, and a great number of other important public works are constructed—is obtained: 20,000 tons of granite have been exported in the year, but the quantity varies much. Pop. (1861) of municipal borough, 3547. Together with Falmouth, it forms a parliamentary borough, which returns two members to parliament, and the population of which, in 1861, was 14,485.

PENSACOLA, a town and port of entry, on a deep bay opening into the Gulf of Mexico, at the south-western extremity of West Florida, U.S. Lat. 30° 24' N., long. 87° 10' W. The town, nearly destroyed during the war of 1861, is on the north shore of the bay, and is connected by railway with Montgomery, Alabama. Near the entrance were the navy yard, hospital, and Fort Barrancas. The entrance is further defended by Fort Pickens, at the west end of Santa Rosa Island, and Fort M'Rae on the opposite point. The bay branches into two divisions, receiving the Escambia and Yellow Rivers. As one of the best harbours on the gulf, P. was settled by the Spaniards, occupied by the British in 1814, and acquired by the United States in 1821.

PENSION (Lat. *pensio*, from *pendo*, to weigh out, to pay), an allowance paid annually by government to an individual in consideration of past services, civil or military. See CIVIL LIST.

PENSIONS AND PENSIONERS, MILITARY AND NAVAL. There are pensions for good service,

Pennyroyal.

like them, a pleasant aromatic smell, and a warm pungent taste; which is much in use in domestic medicine, in the form of a warm infusion, to promote perspiration and as an emmenagogue.

PENNY WEDDINGS, or PENNY BRIDALS, was the name given to festive marriage ceremonies

joints, from which there arise at intervals many whorls of unbranched arms, and which bears at its summit a disc at first divided into five radiating members, and afterwards branching into ten arms, each further subdivided. The whole of this skeleton is calcareous, but it is united by cartilages, and covered with a fleshy integument. *P. Caput Medusæ*, the MEDUSA'S HEAD, is found in the West Indian seas, and is very rare in collections, being only dredged up from waters of considerable depth; from which cause also the nature of the base of the column is not certainly known. The stem is more than a foot long.—The fossil species of *P.* are numerous in the Lias and Oolite formations. They gradually become fewer in the newer rocks.—The stalked young of *Comatula rosacea* was at one time regarded as a *P.*, and described under the name of *P. Europæus*. See CRINOIDEÆ.

PENTADESMA, a genus of trees of the natural order *Guttifera*, to which belongs the BUTTER-AND-TALLOW TREE of Sierra Leone, *P. butyracea*. It is a tree sixty feet high, and produces a conical fruit of the size of a very large pear, the pulp of which abounds in a yellow oily substance, with a strong flavour, somewhat resembling that of turpentine, yet much used by the natives as an article of food. The 'country butter,' brought to the market of Freetown, is supposed to be procured from this fruit.

PENTASTYLE, a building with a portico of five columns.

PENTATEUCH (Gr. fivefold book), a name given by Greek translators to the five books ascribed to Moses, which are in Hebrew called collectively *Torah* (Law), by way of eminence, or *Chamisha Chumshe Torah* (five-fifths of the Torah). *Law* is also the general name by which the work or portions of it are referred to and quoted (the words 'of Moses' or 'of the Lord' being added occasionally) both in the Old and New Testament.

The division into five portions (further divided into 50, 40, 27, 36, 34 chapters, or 12, 11, 10, 10, 11 Parshioth or Sidras respectively, by the Masoretes) is, if not original, at all events of a very remote date, and certainly anterior to the Septuagint. Genesis, Leviticus, and Deuteronomy, the first, third, and fifth books, form clearly defined and internally complete parts of the work as a whole, and thus, also, fix the limits of the intermediate second (Exodus) and the commencement of the concluding fifth (Deuteronomy). The chief aim of the Pentateuch being to give a description of the origin and history of the Hebrew people up to the conquest of Canaan, together with the theocracy founded among them, the centre is formed by the person of Moses himself, the regenerator and lawgiver of the nation. Genesis, beginning with the history of the creation and antediluvian genealogy from Adam to Noah, in rapid outlines sketches the propagation of the various tribes that descended from the one man who was saved in the Deluge, but dwells with special emphasis upon Shem, from whom sprang, in the tenth generation, Abraham, the progenitor of the 'people of the covenant.' The salient events in the lives of his descendants, the Patriarchs, are minutely described; and a fitting close is found in the benediction of Jacob, who, as it were, reinaugurates and confirms all his twelve sons in the covenant made between Abraham and God. Exodus, treating of the liberation of the people from Egypt; their wanderings in the desert; the promulgation of the Law, by which they became emphatically the 'holy nation' and the 'people of the Lord;' and the erection of a visible sanctuary; may be regarded as the nucleus of

the work; while Leviticus, the following book, fittingly enters into the details of the legislation and the mode of worship; chiefly concerning the priests and Levites, the expositors of the Law, and, in a manner, the spiritual representatives of the other tribes. The historical thread is taken up again in Numbers, the fourth book, which, also, side by side with the relation of the events between the Sinaitic period and the beginning of the fortieth year after the Exodus, contains many laws explanatory of, or complementary to, those of the former books, together with such as new circumstances had called into existence. A brief recapitulation of the preceding portions; Moses's most impressive and reiterated exhortations to keep that Law, which was now completed, and solemnly transmitted to the Levites; and the death of the legislator himself; form the chief contents of the fifth book, or Deuteronomy. Thus, the theocratic plan of the work is carried through from beginning to end, coming out more prominently in the three intermediate books, but never lost sight of entirely. Nothing is dwelt or even touched upon save that which in some way illustrates either the relation of God to the people, or of the people to God; the political, civil, and domestic laws themselves, being enumerated only as bearing upon the main aim and object of the work.

The special books being treated separately under their respective heads, we have here only to consider some questions relating to the work as a whole, and principally that of its authorship and history, as far as these points have not been touched upon already under GENESIS. Tradition, as embodied in the earliest historical records, mentions Moses as the writer of the complete Pentateuch, such as it is before us: with the exception of a few verses, describing the last moments of the lawgiver, &c., which were ascribed to Joshua. This tradition has for many a long century been almost universally adhered to. Not that there have not at different periods suspicions been raised respecting this 'authenticity.' The Pseudo-Clementines, for instance, assumed that the Law, orally delivered by Moses to the Elders, had, before and after its being committed to writing, undergone innumerable changes, nay, corruptions; among these the too personal and human conceptions of God, and the unworthy traits recorded of the Patriarchs. Jerome expresses himself in a somewhat doubtful manner on the relation of Ezra as the 'redactor,' or rather 'restorer,' of the Pentateuch. Aben Ezra boldly calls several passages later interpolations, and speaks of others still more poignantly as a *Seod*, or a 'Mystery,' i. e., as containing difficulties not to be cleared away in consonance with the common belief, which he, however, was too pious wantonly to disturb. Other voices, vaguely lifted up by more or less competent scholars, remained unheard. It was not until long after the Reformation, at the dawn of the exegetical and critical modern age, that the question whether this codex was the work of one man, or even of one age, and what share, if any, Moses had in its composition, began to be discussed seriously and on scientific grounds. Hobbes held that the Pentateuch was rather a work on, than by Moses. Spinoza came to the conclusion, that it was to Ezra that we were indebted for the book in its present shape, and that it embodies certain genuine portions, collected at a late period, together with a vast amount of later material, added at various periods subsequent to the time of the supposed author. Vitringa, Le Clerc (Clericus), Rich., Simon, and others, followed, resuming and enlarging the discussion chiefly respecting the difficulties which presented themselves in the accounts of the creation, and the like, contained

in Genesis. The next, and indeed the most important step—because the one which at once removed the question from the field of hazy and timid speculations to that scientific basis upon which it still rests, was taken by Astruc, who, from the marked difference of the Divine names used in Genesis and the beginning of Exodus—noticed in the TALMUD and the FATHERS OF THE CHURCH—came to the conclusion, that these books had been worked up from different original documents, which he called Jehovistic and Elohistie respectively. See article GENESIS, where the development of this speculation is described. At the present stage of the investigation, the view very generally adopted is the 'complementary theory,' which assumes, with certainty, two or more authors—Jehovists and Elohistes—for the whole of the first four books, at least; the fifth being by some (Delitzsch, Schulz, Kurz, &c.) still ascribed chiefly to Moses's own hand. Only a small apologetic school, of which the chief spokesman is Hengstenberg, still upholds the entire integrity and authenticity of the work, pronouncing Moses its sole author. The contemporary discussions on these points, which, up to within a very recent period, were chiefly confined to Germany, have now also found their way into England. The impulse to the controversy in this country was principally given by Dr Davidson, the 'Essayists and Reviewers,' and Bishop Colenso, all of whom, on the basis of these German investigations, raised some new points. Innumerable replies, by more or less competent champions, have been issued; but as yet, so far from either of the combatants having declared themselves convinced by the arguments from the other side, the controversy elicits new publications uninterruptedly.

While endeavouring to trace, in the briefest of outlines, some of the chief objections raised against the Mosaic authorship, and the replies given thereto, we must remind the reader that ours is only the task of epitomisers, as it were, and that the very nature of our task precludes us from giving any opinion whatsoever about the superior force of the arguments on either side.

A work, alleged to be the production of one man, it is urged, first of all, ought to contain neither unnecessary repetitions of considerable length, nor contradictions, nor anachronisms. There ought to be a plan and a unity. Yet, there can be no doubt, they say, about the fragmentary character of the Pentateuch. Many portions, evidently complete in themselves, are strung together without the slightest logical sequence, nay, in an unchronological order. As to repetitions and contradictions, there is, to begin with, the very history of the creation, which occurs twice in the first chapters of Genesis, in each time given differently, and in each account the Divine name is consistently mentioned in a different way. The same is to be said with regard to the account of the Deluge, and several incidents in the lives of the Patriarchs; the important conversation between God and Moses respecting Aaron (Exod. iv. 10—16, and vi. 9); the descriptions of the tabernacle; the priestly vestments; the story of the manna as given in Exodus and Numbers; the account of the appointment of the council of the 70 elders in the same books; &c. Again, the work itself sometimes seems to indicate an author who is not the legislator himself, such as the phrase of Moses being the humblest of men; the account of his own death; the passage in Genesis 'before there reigned any king over the children of Israel' (xviii. 31); the occurrence of the name of the city of Dan (Gen. xiv. 14, Deut. xxxiv. 1), so called only after the conquest by that tribe. In Numb. xxxii. 34, again, we have an enumeration of a certain

number of towns and villages built by the tribes of Gad and Reuben—an event which could not have happened during Moses's lifetime; further, the frequent occurrence of the formula 'unto this day' (e. g., Deut. x. 8, where the author speaks of the institution of the Levites as being still in force 'up to this day'), &c. It is contended, also, that the language of the Pentateuch varies very little from that of the last prophets, and that it can hardly be assumed that a thousand years should have made no perceptible difference in the idiom; more particularly has Deuteronomy been supposed to bear a striking resemblance, in style and language, to Jeremiah. The Pentateuch is further said to contain many facts palpably contradictory to natural laws, as they are established in the experience of the whole historical human race, and systematised by science.

Of the many ways to get rid of these and similar—old and new—exceptions, the most generally adopted is that which we mentioned as the method of 'interpolation,' by which the Apologetic School strikes out some fifty or more passages, as not belonging to the original work, but having crept in, by way of commentary, note, or explanation, in post-Mosaic times—the body of the work being thus saved, so to say, by a most extensive amputation. As to the argument from the language, it is said that the Pentateuch, being the divine book, by way of eminence, and embodying the very phrases (to the letter) made use of by the Almighty, must needs have served as a model for the next thousand years, and priests and Levites, the teachers of the people, were enjoined constantly to study and read it: hence the small difference in the later writers. Arabic and Syriac, it is argued, did likewise not change essentially for many centuries—an assertion, however, which only holds good if 'many' is taken in a very vague sense indeed. That Deuteronomy differs in style and manner, is verbose, &c., is explained by Moses's advanced age. On the other hand, events which are not in harmony with the 'natural laws,' are accepted by the orthodox simply and literally as 'miracles,' while 'conservative' rationalists of the school of Eichhorn, Rosenmüller, and others, who stand by the authenticity of the Pentateuch, have been at great pains to find some kind of poetical interpretation for them.

The most recent attacks on the authenticity are chiefly founded upon arithmetical grounds. The numbers of the people, their cattle, and the like, at various periods, do not seem to conform to the laws of natural increase, or even to the geometrical limits within which they were at times stated to have been confined. Among the direct proofs, however, proffered by the defenders of the authenticity, the following chiefly deserve attention. Deuteronomy, it is averred, can only be the work of Moses. He speaks in it to the men whom he has led for many years, as one who has lived through all the events himself. There is no possibility of any one imitating the local colouring in such a manner. If, then, Deuteronomy must be allowed to be the work of Moses, the three preceding books, to the contents of which frequent allusion is made, must equally be supposed to be finally redacted, if not written, by the same hand; and it further follows naturally, that the introduction to these books, which is Genesis, must have emanated from it. Again, any one writing after Moses, could not possibly have possessed the extraordinarily correct knowledge of contemporary Egypt and Arabia, which appears throughout the Pentateuch. A writer who might be supposed to have acquired it by dint of study of antiquities, must, it is said, have betrayed himself on every page by inaccuracies and

anachronisms. Nineveh is in Genesis a city of as yet little importance; while Resen, of which no trace is to be found in any other part of the Bible, is the great metropolis of Assyria of the time. Tyre, great in the days of David, and mentioned already in Joshua, is not to be met with in the Pentateuch, where a later writer would certainly have spoken of it in connection with Sidon. The Canaanite gods and altars are often spoken of; never their temples, of which yet we read in Joshua. Why, then, should that very ancient author, to whom must needs be traced the Pentateuch, not be Moses himself, rather than some contemporary of his? The fragmentary, abrupt, and, as it were, confused character of the work, the apologists further urge, so far from testifying against Moses, confirm the tradition of his authorship. Would not a later historian have worked the mixed mass of historical, geographical, legal, and personal material into a methodical and systematical whole? Who else could have imparted to the book the impress of a diary, so to say, but the man who was in the midst of the events, jotting down all the items important either in his own individual or the national career? And who but one standing in its very centre could depict with such glowing colours the life that moved around him?—But a further direct argument for the authenticity is found by them in the very item of the language of the Pentateuch. True, they say, it resembles as much as can be that of the later books, because, as we said before, it remained the classical language for all later generations; but, on the other hand, it offers certain peculiarities—such as the use of a common pronoun of the third person singular for both the masculine and feminine genders; the same term for boy and girl; and the like archaisms—all of which distinctly prove it to be a work of a very much older date. The existence of an ancient Mosaic code of laws would further appear proved beyond any doubt by the constant recurrence of quotations from ‘the Law of Jehovah’ or ‘the Law of Moses’ throughout the other books of the Old Testament from Joshua to Hosea. Had there in reality been no such code in existence, the authors of the different biblical works could not possibly have so unanimously spoken of it without betraying a conscious forgery somewhere. That Ezra should have been the author, or, at all events, the refounder of the Pentateuch, is equally improbable, on account of the spirit, tone, language, and all those smaller peculiarities of which mention has been made; and he would, on the other hand, never have been able so skilfully to avoid his own individual manner and style, as it appears in his own book. The Samaritan P., it is further said, which, with a very few characteristic alterations, is an accurate transcript of our Pentateuch, would have been an utter impossibility, considering the hostile relations between the Samaritans and the Jews, if it had not been well known as a genuine document before the division of the empire. That Hilkiah, who is said to have found the Book of the Law in the temple in the days of Josiah (2 Kings, xxii.; 2 Chron. xxxiv.) should have been its real author—an opinion first advanced by De Wette—would imply a complicity in the forgery not only on the part of Jeremiah, Huldah, and the elders, but almost of the whole people, among whom, on the contrary, there certainly seems to have been living a very vivid tradition of the former existence of the book or some of its portions at least. Moreover, had it been first written in those days, there surely would have been introduced some kind of prophetic allusion to the royal house of David, or, at all events, a pedigree and origin differing from the incestuous

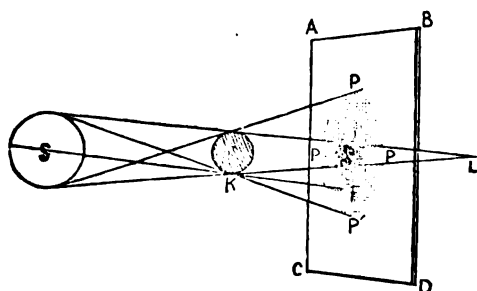
one given in Gen. xxxviii. Deuteronomy would altogether have changed its language about Royalty (xvii. 15–20) very considerably; and Joseph’s would not have stood out so prominently as a favoured tribe. The alleged difficulties respecting the numbers are explained away more or less convincingly—in the most difficult cases, by miraculous interference. Corruptions, interpolations, and the many fates that befall ancient documents, are allowed to have crept in, in some places; although this argument is given up by those who hold that a special providence watched over the divine work. In all other respects, they hold these books are exactly as they were written by Moses under direct ‘Inspiration.’—Thus far, in swiftest outlines, the pros and contras most commonly adduced, and worthy of some consideration.

A few rationalistic critics, however, have gone so far as to deny the very possibility of Moses having given the laws contained in the Pentateuch, chiefly founding their objections upon the ground that he was not likely to have been versed in the art of writing to an extent which the composition of these laws would presuppose. Egyptian characters, with which he might have been familiar, could not have been used for Hebrew composition; and the Hebrews themselves, uncultivated as they were, did not possess any characters of their own. There has only, in reply to these objections, that fact to be stated, that a soberer criticism of more recent date has found itself obliged, in deference to certain paleographical and other scientific truths, to give up most of these points, or, at all events, to found no such sweeping condemnation upon those which still remain. On the contrary, whichever of the hypotheses enumerated at the beginning is assumed, the groundwork of the legislation is traced back, by almost unanimous consent, to the historical person of Moses, who is no longer the mythical demigod of barbarous hordes, but a man, such as we have endeavoured to sketch under that head. The final redaction of these laws, however, as of the whole of the Pentateuch, is almost as unanimously—more especially by German critics—placed in ages long after him.

In the contemporary ‘moderate’ school in England, so far as we have been able to glean from their writings, the following seems to be the prevalent opinion on the point of the Mosaic authorship: It is allowed, that Moses did not write the whole of the Pentateuch, but portions of Exodus, Leviticus, and Numbers, and the whole of Deuteronomy, with the exception of the account of his death, and such portions as palpably shew an author who points to the imminent dissolution of the empire. That even the fundamental Law (Decalogue) should be found in two varying versions, they hold, strengthens rather the assumption of their genuine Mosaic authorship in some original shape. The later editor, finding two different recensions made by contemporaries, or in subsequent ages, embodied them both, on account of their paramount importance, literally. Genesis was worked up from ancient documents, composed by various writers, living at various ‘prehistoric’ periods, either by Moses himself, or under his supervision, by some of the elders. The first redaction of the five books as a whole took place after the conquest of Canaan, through Joshua and the elders; the second and final redaction, however, in which it received its present shape, is to be dated from the time of Ezra, after the return from the exile.

The majority of continental modern critics of the more moderate stamp—who repudiate the notion of their belonging to the advanced rationalistic party—hold opinions of a very different kind; and since they have found professed partisans in England, the

figure will at once make plain their origin and relation, for if S be the illuminating body, E the object whose shadow is cast on the surface,



ABCD, it is seen that the small portion, uu' , receives (omitting all consideration of refraction, dispersion, &c., of light) no light from S, while the whole surface outside of PPP' is completely illuminated. The point P' receives light from the whole of S; the point F is only half illuminated, and that by the lower part of S, the illumination of the points becoming less and less as they approach u' , which is unilluminated. The portion within uu' is the umbra, and that between the boundaries PPP' and uu' is the penumbra, which, as we have seen, gradually shades from perfect light at the outer boundary to perfect darkness at the inner, so that it is almost impossible exactly to note its limits on either side. This phenomenon, it is evident, can only occur when the illuminating body is of such a size, real or apparent, as to make the angle, $P'Ku'$, of sensible magnitude; and it is equally evident that the nearer the body E approaches the plane on which its shadow is cast, the larger is the umbra and the smaller the penumbra; while by increasing the distance between E and the plane, so that the point L shall fall between them, the umbra is made to vanish, and the penumbra is increased. This is well illustrated by natural phenomena: the shadow of a man cast by the sun on the ground presents almost no penumbra; the shadow of the earth thrown by the sun upon space at the distance of the moon gives a penumbra many times as large as the umbra; and sometimes, when the moon is new at her apogee, for instance, her shadow cast upon the earth exhibits no umbra. Spectators on the earth who see a partial eclipse of the sun, are situated within the penumbra, but within the umbra when they observe a total eclipse; while if the eclipse be annular, the umbra does not exist in the shadow cast by the moon on the earth's surface. See ECLIPSES.

PENZA, a central government of European Russia, between the government of Nijni-Novgorod on the north, and that of Tambov on the west. Area 14,670 square miles, pop. 1,161,575. The surface is in extensive and elevated plains, marked occasionally with ridges of low hills. The rivers are tributaries of the Don and Volga, and three of them, the Khoper, the Soura, and the Moksha, are navigable. The climate, though rather cold in winter, is temperate, agreeable, and healthy. The soil, consisting, for the most part, of black earth, is extremely fertile, and agriculture is the principal employment of the inhabitants. Grain of different kinds, leguminous plants, beet-root, flax, hemp, tobacco, and hops are the principal products. Much of the grain is used in the numerous distilleries, and considerable quantities of it are exported to the neighbouring governments. About one-third of the entire area is covered with forests, some of

which consist entirely of oak-trees. The manufactures are centred chiefly in the towns; cloth and leather are the principal articles made. The commercial improvement of the government is hindered by the want of direct means of communication with the consuming districts. The principal towns are Penza, Mokshansk, and Saransk.

PENZA, a town of European Russia, capital of the government of the same name, on the Soura 220 miles south-south-east of Nijni-Novgorod. It was founded in the middle of the 17th c., as a defence against Tartar invasion, is a handsome town, occupying an elevation, and containing 19 churches, 2 convents, many gardens, a large park, with a beautiful fruit-garden and a horticultural school. It possesses 2 cloth-factories, 4 iron-works, several soap-boiling and candle-making establishments. The principal articles of commerce are corn and timber, which is floated down the Soura during spring. Pop. 22,280.

PENZA'NCE, a market and sea-port town, and a municipal borough of England, in the county of Cornwall, stands on the north-west shore of Mount's Bay, 22 miles west-south-west of Falmouth. It is the most westerly town in England—the light-house on its pier being in lat. $50^{\circ} 7' N.$, and in lon. $5^{\circ} 28' W.$ The town, standing on a finely-curved shore, surrounded by rocky eminences, and in a fertile district, is exceedingly picturesque in situation, and is famous for its mild, though somewhat moist climate. Its esplanade, one of the finest in the west of England, commands charming land and sea views. The chief buildings, most of which are constructed of granite, are the town-hall and corn-market, surmounted by a dome, and the chapels of St Paul and St Mary. There are numerous boarding-houses for the accommodation of the visitors attracted hither by the temperate and equable climate, by the beauty of the neighbouring scenery, and the curiosities of the district of Land's End. Woollen yarns and cloths are manufactured; the fishery employs upwards of 2000 persons; agricultural produce, pilchards, and tin and copper ores produced from the mines of the vicinity are exported; and timber, iron, hemp, and hides are the chief imports. The harbour is accessible for vessels of considerable burden, and is furnished with a pier 800 feet in length. In 1863, 3732 vessels of 360,511 tons entered and cleared the port. Pop. (1861) of municipal borough, 9414.

P. was laid in ashes by a party of marauding Spaniards in 1595, and was sacked by Fairfax in 1646.

PE'ON. See CALOPHYLLUM.

PEO'RIA, a city and port of entry in Illinois, U.S., on the west bank of the Illinois River, which is crossed by two bridges of 2500 feet, at the outlet of Peoria Lake, 70 miles north of Springfield, and 160 miles south-west of Chicago. It is connected by steamboat navigation with the Ohio and Mississippi, by canal with Lake Michigan, and is an important station on the great network of western railways. Bluffs of bituminous coal, opening upon the river banks, supply numerous manufacturing establishments. There are 24 churches, and numerous schools and public institutions. Pop. (1860) 14,425.

PEPÉ. Three Neapolitans of this name have played an important part in history. The first of these was GABRIELE PEPE, who was born in 1781 at Bojano, in the present province of Campobasso, Italy, and was a student of law in 1799, when, on the proclamation of the Parthenopean Republic, he took service in the Franco-Neapolitan army, and was consequently exiled on the fall of

younger son of Charles Martel, who, on the death of his father in 741, received Neustria and Burgundy; Austrasia, Thuringia, and Suabia being the heritage of his elder brother Carloman. Aquitaine was nominally a part of P.'s dominions, though, as it was really independent under its own duke, he made several attempts to subdue it; but the duke was quite able to hold his own against both P. on the one hand and the Arabs (from Spain) on the other. The farce of governing the country in the name and as the chief minister of the Merovingian sovereign was still kept up, though P. was eagerly longing for an opportunity to assume the crown; but the present time was inopportune, as no sooner was the restraint of Charles Martel's iron hand removed by death, than revolts broke out in all quarters among the Franks, Germans, Bavarians, and Gascons. The country, by the united exertions of P. and Carloman, was restored to tranquillity about 745. Those princes who had excited the insurrection were mostly deposed, and otherwise punished, and the Duke of Aquitaine was compelled to acknowledge at least the nominal sovereignty of Pepin. In 747, Carloman bade adieu to power, and retired into a convent, leaving his government to his sons, who were immediately dispossessed by Pepin. After crushing a rebellion of Saxons and Bavarians, P. began to carry out his favourite project of dispossessing the Merovingian dynasty of even the semblance of authority, and of originating in person a new royal dynasty. To gain his point he flattered the clergy, then the most influential body in France; and as they had been despoiled by Charles Martel for the behoof of his warriors, a moderate degree of kindness and generosity on the part of P. contrasted him so favourably with his father, that the clergy at once became his partisans. So did the pope, who felt the importance of securing the aid of the powerful Frankish chief against the Lombards, who were then masters of Italy, and released the Franks from their oath of fidelity to Childeric, the Merovingian monarch. On learning this, P. at once caused himself to be elected king by the assembly of estates at Soissons, and was consecrated by the Bishop of Mayence (March 752). Childeric retired to a convent, where he died in 755. P. was the first Frankish monarch whose election received the sanction of the pope, and who was consecrated to his high dignity; and these solemn ceremonies put the crown to a great extent at the mercy of the clergy, who from this time took a political rank in the state. The practice, too, followed by P. and his predecessors in office, of gaining partisans by granting particular fiefs to various chiefs, greatly strengthened the feudal system, and proportionally weakened the royal power. This effect, however, did not shew itself till after the subsequent reign of Charlemagne, on account of the personal genius of these two rulers. P. was soon called upon to aid the pope against the Lombards, and marching into Italy at the head of a large army, he compelled Astulf, the Lombard king, to retire from the siege of Rome, and restore several cities which had previously belonged to the Greeks; these were now handed over to the pope. He had hardly returned to France, when he was anew summoned (755) to Italy, the Lombards having broken their engagements. This time he took Ravenna, Emilia, the Pentapolis, and the duchy of Rome from the Lombards, reuniting them to the Holy See. After the settlement of affairs in Italy, the turbulent nations on his eastern frontier demanded his attention. The Saxons and other German tribes were defeated (757), their country cruelly ravaged, a heavy tribute exacted, and numbers of captives and hostages taken. Resolved to unite the whole of Gaul under his authority, he

eagerly accepted the invitation of the Visigoths of Septimania to aid them against the Arabs, who had taken possession of the country; and after a war of many years' duration, Narbonne, the last of the Arab strongholds, was taken, and the country, freed of these invaders, at once acknowledged P.'s authority. The remaining years of his reign were occupied in reducing the independent monarchy of Aquitaine, which was not accomplished till, after nine years (760—768) of desolating warfare, P. obtained the assassination of his opponent, Duke Waifre, whose partisans then laid down their arms, surrendering to the Frankish monarch the vast provinces which stretch from the Loire to the ocean and the Pyrenees. Shortly after this conquest, P. died of dropsy, September 768. He was a most active, enterprising, and in general fortunate prince; he established the unity of the Gallic nation, and protected it as far as could be done by invading and ravaging the territories of the neighbouring nations, though he also introduced those elements of weakness into its constitution which reduced the authority of his successors to such a deplorable state. The others of this name, though important personages at the time, make little figure in history.

PEPPER (*Piper*), a genus of plants of the natural order *Piperaceæ* (q.v.), which once included the whole of that order; but, as now limited, consists of plants with woody stems, solitary spikes opposite to the leaves, and covered with flowers on all sides, the flowers mostly hermaphrodite. The most important species is COMMON P. or BLACK P. (*P. nigrum*), a native of the East Indies, now cultivated also in many tropical countries, and extensively in some parts of the New World; its fruit being the most common and largely used of all spices. It is a rambling and climbing shrub, with smooth and spongy stems, sometimes twelve feet in length; and broadly ovate, acuminate, leathery leaves. The fruit is about the size of a pea, of a bright-red colour when ripe, not crowded on the spike. In cultivation, the P. plant is supported by poles, or by small trees planted for the purpose, as it loves a certain degree of shade, and different kinds of trees are often planted for this purpose in India. It is propagated by cuttings, comes into bearing in three or four years after it is planted, and yields two crops annually for about twelve years. When any of the 'berries' of a spike begin to change from green to red, all are gathered, as when more fully ripe they are less pungent, besides being apt to drop off. They are spread on mats and separated from the spikes by rubbing with the hands or by treading with the feet, after which they are cleaned by winnowing. The *Black P.* of commerce consists of the berries thus dried, and become wrinkled and black; *White P.* is the seed freed from the skin and fleshy part of the fruit, to effect which the dried fruit is soaked in water and then rubbed. *White P.* thus prepared is of a whitish-gray colour, but not unfrequently undergoes a bleaching by chlorine, which improves its appearance at the expense of its quality. *Black P.* is much more pungent than *White P.*, the essential constituents of the spice being more abundant in the outer parts of the fruit than in the seed. P. depends for its properties chiefly on an acrid resin and an acrid volatile oil; it contains also a crystalline substance called *Piperin*.—The fruit of *Piper tricoicum*, a species very similar to the Common P., is more pungent; and it is cultivated in some parts of India.—The fruit of other species of *Piperaceæ* is used as pepper in their native countries; that of *Coccoloba Capense* at the Cape of Good Hope; that of *Peltobryon longifolium*, of *Artanthe crocata*, or *A. trichostachya*, and of *Serronia jaborandi* in South

Before the Reformation parochial perambulations were conducted with great ceremony. The lord of the manor, with a large banner, priests in surplices and with crosses, and other persons with hand-bells, banners and staves, followed by most of the parishioners, walked in procession round the parish, stopping at crosses, forming crosses on the ground, 'saying or singing gospels to the corn,' and allowing 'drinkings and good cheer' (Grindal's *Remains*, pp. 141, 241, and *Note*; Whitgift's Works, iii. 266—267; Tindal's Works, iii. 62, 234, Parker Society's Edition), which was remarkable, as the Rogation days were appointed fasts. From the different practices observed on the occasion the custom received the various names of *processioning*, *rogationing*, *perambulating*, and *garrying the boundaries*; and the week in which it was observed was called *Rogation week*; *Cross week*, because crosses were borne in the processions; and *Grass week*, because the Rogation days being fasts, vegetables formed the chief portion of diet.

At the Reformation, the ceremonies and practices deemed objectionable were abolished, and only 'the useful and harmless part of the custom retained.' Yet its observance was considered so desirable, that a homily was prepared for the occasion; and injunctions were issued requiring that for 'the perambulation of the circuits of parishes, the people should once in the year, at the time accustomed, with the rector, vicar, or curate, and the substantial men of the parish, walk about the parishes, as they were accustomed, and at their return to the church make their common prayer. And the curate, in their said common perambulations, was at certain convenient places to admonish the people to give thanks to God (while beholding of his benefits), and for the increase and abundance of his fruits upon the face of the earth, with the saying of the 103rd Psalm. At which time also the said minister was required to inculcate these, or such like sentences, Cursed be he which translateth the bounds and doles of his neighbour; or such other order of prayers as should be lawfully appointed.' (Burn's *Ecclesiastical Law*, vol. iii. 61; Grindal's *Remains*, p. 168.)

Those engaged in the processions usually had refreshments provided for them at certain parts of the parish, which, from the extent of the circuit of some parishes, was necessary; yet the cost of such refreshment was not to be defrayed by the parish, nor could such refreshment be claimed as a custom from any particular house or family. But small annuities were often bequeathed to provide such refreshments. In the parish of Edgcott, Buckinghamshire, there was about an acre of land, let at £3 a year, called 'Gang Monday Land,' which was left to the parish-officers to provide cakes and beer for those who took part in the annual perambulation of the parish.

To this day, questions of disputed boundary between parishes are invariably settled by the evidence afforded by these perambulations; for in such questions, immemorial custom is conclusive. And so far are they recognised in law, that the parishioners on such occasions are entitled to trespass on lands, and even to enter private houses if these stand on the boundary line. In Scotland, where the parochial principle has never been developed as in England, there seem to be few traces of a similar practice. But, as between neighbouring landowners, a brieve of perambulation is the technical remedy for setting right a dispute as to boundaries or marches; and perambulating or 'riding' the bounds of boroughs is a common practice.

The necessity or determination to perambulate along the old track often occasioned curious

incidents. If a canal had been cut through the boundary of a parish, it was deemed necessary that some of the parishioners should pass through the water. Where a river formed part of the boundary line, the procession either passed along it in boats, or some of the party stripped and swam along it, or boys were thrown into it at customary places. If a house had been erected on the boundary line, the procession claimed the right to pass through it. A house in Buckinghamshire, still existing, has an oven passing over the boundary line. It was customary in the perambulations to put a boy into the recess to preserve the integrity of the boundary line.

At various parts of the parish boundaries, two or three of the village boys were 'bumped'—that is, a certain part of the person was swung against a stone wall, a tree, a post, or any other hard object which happened to be near the parish boundary. This, it will scarcely be doubted, was an effected method of recording the boundaries in the memory of these *battering-rams*, and of those who witnessed this curious mode of registration.

The custom of perambulating parishes continued in some parts of the kingdom to a late period, but the religious portion of it was generally, if not universally, omitted. The custom has, however, in late years been revived in its integrity in many parishes.

PERCEPTION. This word refers to our reception of knowledge through the senses, an operation that to the common understanding seems simple enough, but, viewed philosophically, is attended with much difficulty. Perception, considered as a source of knowledge, refers exclusively to the outward or the object world—the world of extended matter and its properties. The names for the act of knowing one's own mind—the feelings and thoughts of the individual—are Self-consciousness and Self-introspection. The word 'consciousness,' is sometimes improperly limited to this signification. Locke used the term 'Reflection' for the same meaning, but this is ambiguous, and is now disused. All knowledge is thus said (by those that deny innate ideas) to spring from two sources—Perception and Self-consciousness.

Two great disputes connect themselves with Perception, both raised into their full prominence in the philosophical world by Bishop Berkeley. The first is the origin of our judgments of the Distances and real Magnitudes of visible bodies. In opposition to the common opinion on this subject, Berkeley maintained that these were learned by experience, and not known by the mere act of vision. See VISION.

The second question relates to the grounds we have for asserting the existence of an external and material world, which, in the view of Berkeley, was bound up with the other. Inasmuch as perception is a mental act, and knowledge is something contained in a mind, what reason have we for believing in the existence of objects apart from our minds? or what is the mode of existence of the so-called external world?

The following sentences shew in what manner Berkeley opened up the question: 'That neither our thoughts, nor passions, nor ideas, formed by the imagination, exist without the mind, is what everybody will allow; and it seems no less evident that the various sensations or ideas imprinted on the sense, however blended or combined together (and whatever objects they compose), cannot exist otherwise than in a mind perceiving them. I think no intuitive knowledge may be obtained of this by one that shall attend to what is meant by the term *exist* when applied to sensible things. The table

repeatedly conscious that a tree becomes larger and larger to the eye in connection with a definite locomotion on our part, called the forward advance; that this movement brings on at last a sensation of touch; that this sensation of touch varies with definite movements of the arms, and so on; the repetition of all this train of experience fixes it on the mind, so that from one thing alone, as from the distant vision of the tree, we can anticipate, or as it is otherwise called, perceive all the other consequences. We then know, without going through the steps, that the specified movements will bring about all the sensations above described, and we know nothing else; this knowledge, however, is to us the recognition of external existence, the actual fact that is meant when a material world is spoken of. Belief in external reality is the sure anticipation of certain sensations on the performance of certain movements; everything else said to be implied in it is but a convenient hypothesis for aiding the mind in holding together those multifarious connections that our experience has established in the mind. In order to account for the fact that the conscious movement of elevating the upper eyelid is followed with the sensation of light, to us and to other minds, we suppose a luminous agency always existing even when not affecting us or any other person; we cannot know or verify this supposition—it is a generalisation founded upon particular experiences, and serving to sum up those experiences in a convenient form, but no such perennial independent substance can be absolutely proved.

PERCEVAL, SPENCER, RIGHT HON., English minister, was the second son of John, Earl of Egmont; born November 1, 1762; educated at Harrow, and at Trinity College, Cambridge. He was called to the bar, and soon obtained a reputation as a diligent lawyer. A clever pamphlet on the abatement of the impeachment of Warren Hastings, made him known to Pitt. Obtaining a seat in parliament for Northampton, he was soon conspicuous for his extreme horror of popery, and his violent advocacy of what was called by his party the 'Protestant interest.' In the Addington administration, he was made Solicitor-general in 1801, and Attorney-general in 1802. He was afterwards induced to abandon his profession, and adopt a political career. In the Portland administration of 1807, he was made Chancellor of the Exchequer, and was even then the real head of the government, his influence with George III. being obtained by the depth of his bigotry and his pertinacious opposition to the Catholic claims. On the death of the Duke of Portland in 1809, P. became Premier, uniting to his office of Chancellor of the Exchequer that of First Lord of the Treasury. He was retained in power by the Prince of Wales on his accession to the regency. On the 11th May 1812, about 5 P.M., as P. was entering the lobby of the House of Commons, a man named Bellingham fired a pistol at him, the ball pierced his heart, and he instantly expired. The assassin made no attempt to escape. He was a Liverpool broker, trading with Russia, who, having sustained some losses and injuries, which he had vainly applied to the government to redress, determined to avenge himself by taking the life of the prime minister. P.'s assassination shocked the public mind, and parliament hastened to make an ample provision for his widow and numerous family. His death was, however, rather a private than a public calamity. 'With all my respect for the virtues and excellences of the late minister,' said the Marquis of Wellesley, who had held the office of Foreign Secretary in his administration, 'I still feel it my duty to say that I did not consider him a

fit man to lead the councils of this great empire.' He was ready in debate, a placid and not ungraceful speaker, and led the House of Commons with much tact; but he was superficial and intolerant. Sydney Smith, in his *Letters of Peter Plymley*, has conferred a species of immortality upon him by his wit and sarcasm. It was the fashion, when P.'s public policy was attacked, to laud his domestic virtues. 'Peter' said, if he had to choose between a public and private virtues, he should prefer that Mr P. 'owed for the veal of the preceding year, whipped his boys, and saved his country.'

PERCH (*Perca*), a genus of acanthopterous fishes, of the family *Percidae*, to which it gives its name, and which includes many genera and a very great number of species both of marine and fresh-water fishes. The *Percidae*, or P. family, have the body somewhat oblong and more or less compressed, the scales rather large; the bones of the gill-covers toothed or otherwise armed; the mouth without barbels; the vomer toothed, and generally also the palate; there are sometimes two dorsals, sometimes only one. To this family belong not only the true perches, all of which are fresh-water fishes, but the Lates (q. v.) of the Nile, the Basses (q. v.) or Sea P., and their congeners the Pike Perches (q. v.), the *Serran*i, and many other fishes. The true perches (*Perca*) have two dorsal fins, distinct and

Perch (*Perca fluviatilis*).

separate, the rays of the first spinous and those of the second flexible; the tongue is smooth; and the gill-covers are bony, notched, and sharply serrated. The Common P. (*P. fluviatilis*) is an inhabitant of the lakes, ponds, and still rivers of almost all parts of Europe. It is very common in England and Ireland, and is found in many of the waters of the south of Scotland, although in the north it is rare, and is said to exist only where it has been introduced. But it is found in Scandinavia, and even in Lapland. It is of a greenish-brown colour, passing into golden yellow on the under parts, and marked on the back with six or seven indistinct blackish cross-bands. Its height is about one-third of its length. It often attains a length of 16 or 18 inches, and a weight of 2 or 3 pounds, but perches have been taken of 8 pounds weight or more. The P. lives in still waters, and is easily reared in ponds, but it is not a desirable inmate of ponds intended for other fish, because it is very voracious, and devours their fry. It is readily caught by almost any kind of bait, and sometimes takes a small artificial fly. It is much esteemed for the table. It lives a long time out of the water if kept moist, and in some countries is thus brought to market, and carried back to the pond if not sold. The female P. deposits her eggs in long strings, united by a viscid matter.—A species of P. (*P. Italica*), found in the south of Europe, differs from the Common P. in its shorter and deeper form, and want of black bands. Several species are natives of the rivers and lakes of North

the sound is *dull* in proportion to the density and want of elasticity of the part struck. The first thing that must be acquired in order to make percussion useful in the diagnosis of disease, is an accurate knowledge of the sounds elicited from the different parts in their normal condition. When, for example, the healthy pulmonary percussion note is known, increased resonance of the walls of the chest will indicate a dilatation of the air-cells (or Pulmonary Emphysema), while various degrees of dullness will afford evidence of such morbid changes as the effusion of fluid into the pleura (Hydrothorax), or inflammatory solidification of the lung-tissue (the Hepatisation of Pneumonia), or tubercular deposition. The use of percussion in relation to diagnosis is further shewn in the articles PERICARDITIS and PLEURISY.

PERCUSSION CAPS are small copper cylinders, closed at one end, for conveniently holding the detonating powder which is exploded by the act of percussion in percussion-arms. Caps were not used with the earliest percussion-arms, which the Rev. Mr Forsyth of Belhelvie, Aberdeenshire, patented in 1807; but they became tolerably general between 1820 and 1830, and were adopted for the army by 1840. The manufacture is extremely simple: A sheet of thin copper is stamped into pieces of appropriate shape, which are bent into the form of caps by stamping-apparatus closing round a mandril, the whole being done in one machine by two operations. The caps are then placed in a tray, mouths upward; and the inside of each is touched with a strongly adhesive varnish. Over this is dusted the detonating powder, all the particles which fail to adhere being blown, dusted, or shaken out. A stamper once more is forced into the cap, to fix and compress the powder, and the operation is completed. Large numbers are filled and stamped together, so that many thousands per hour may be turned out by one machine. Admirable mechanism, for the manufacture of caps, is employed in the Royal Laboratory at Woolwich.

For muskets, the caps are charged with equal parts of fulminating mercury and chlorate of potash; for cannon, with a mixture composed of two parts of chlorate of potash, two parts of native sulphuret of antimony, and one of powdered glass; the last ingredient taking no part in the chemical action, and being added merely to increase the friction. For the manner in which a cap is used, see LOCK.

PERCUSSION, CENTRE OF. See CENTRE OF PERCUSSION.

PERCY. This is the name of a noble Norman family who accompanied the Conqueror to England, and whose head, William de Percy, obtained from his sovereign thirty Knights' Fees in the north of England. The representation of the house devolved (temp. Henry I.) on Agnes, daughter of the 3d baron, who married Josceline of Lovain, brother-in-law of the king, only on condition that he adopted either the surname or the arms of P.; he chose to retain his paternal arms and to assume the P. name. The head of the family at the time was one of the chief barons who extorted Magna Charta from King John; and the 9th feudal lord (temp. Edward I.) shewed a similar spirit towards the pope, against whose demands he maintained, with others of the greater barons, the spiritual independence of the English crown. This nobleman's great-grandson was a distinguished military commander under Edward III., and acting as Marshal of England at the coronation of Richard II., was created Earl of Northumberland. He subsequently, however, took up arms against Richard, and placed the crown on

the head of Henry of Lancaster, who became Henry IV. Again dissatisfied with the government, he joined in rebellion with his son Hotspur, for the purpose of transferring the crown to Mortimer, Earl of March. The earl, with the other leaders of this rebellion, fell at Bramham Moor (1407—1408), and his titles became forfeited. These, however, were revived in favour of his grandson, who became Lord High Constable of England, and who was killed at the battle of St Alban's. This earl's son and successor (the third earl) met a like fate on Towton field, fighting in the van of the Lancastrian army. The 4th earl (who obtained a reversal of his father's attainder) was murdered by the populace in Northumberland, when ordered by the avarice of Henry VII. to enforce a subsidy. The executions of the 6th and 7th earls by Edward VI. and Elizabeth are part of the history of England. The 8th earl was committed to the Tower, on a charge of being concerned in a plot in favour of Mary Queen of Scots, and died a violent death in prison. The 10th earl fought in the civil wars against Charles I., though he took no part with the regicides, and eventually joined in the general effort to bring about the Restoration. The 11th earl left an only child, who succeeded to the ancient barony of P., and marrying Charles, Duke of Somerset, became the mother of Algernon, Duke of Somerset, who was created Earl of Northumberland, with remainder to his son-in-law, Sir Hugh Smithson, of Stanwick, in the county of York, a gentleman of respectable lineage. Sir Hugh, succeeding to the earldom, obtained in 1766 his advancement to the dukedom of Northumberland, which title is now held by his grandson, the present duke, who thus represents the ancient house of P. only in the female line.

PERCY, THOMAS, D.D., an eminent poetical collector, antiquary, and scholar, was born at Bridgenorth, Shropshire, in 1728; was educated at Christchurch, Oxford; and having entered the church, rose to be Bishop of Dromore, in Ireland, 1782. He died in 1811. This amiable and accomplished prelate, the friend of Johnson, Goldsmith, and other distinguished contemporaries, published translations from the Icelandic, a new version of the *Song of Solomon*, the *Northumberland Household Book*, a translation of Mallet's *Northern Antiquities*, &c. His most popular and valuable contribution to our literature was the *Reliques of Ancient English Poetry*, consisting of old heroic ballads and songs, with some modern imitations, in which the editor himself displayed the taste and feeling of a poet. This work appeared in 1763, and P. lived to see four editions of it called for by the public, and to receive the warm commendations of all poetical readers and critics. The *Reliques* were chiefly obtained from an old folio MS. that had fallen into P.'s hands, with the addition of pieces from the Pepys collection at Cambridge, the Ashmole Library at Oxford, the British Museum, and the works of our earlier poets. Certain liberties were taken with some of the ballads—softening touches, repairs, and renovations—for which the editor was severely censured by Ritson and other antiquaries; but the collection was of great value to our literature, recalling the public taste to the rude energy, picturesqueness, and passion of the old chivalrous minstrels and Elizabethan songsters. It captivated the youthful imagination of Walter Scott, and was the inspirer and model of his *Minstrelsy of the Scottish Border*. The memory of P. has been still further perpetuated by a Club Book Association, called the **PERCY SOCIETY**. See CLUB BOOKS, in Supplement.

PERDIDO, a bay and river of Alabama, U.S.

that of corn, whilst all the corn plants are annuals. —There is great diversity in the duration of life of perennial plants.

PERESLAV, or **PEREIASLAVLE-ZALIE-SKY**, a district town in the middle of Great Russia, in the government of Vladimir, and 70 miles north-west of the city of that name. It was founded in 1052 by George, Prince of Soudal. It possesses upwards of 30 churches and religious institutions; but is principally noteworthy for its factories, which are nine in number, and of which the most important are cotton-mills and print-works for cotton goods. The factories yield in all an annual profit of about £3,000,000. The cotton manufactures of P. are exported to the fairs of Nijni-Novgorod and Irbit, and even to China by way of Siberia. Pop. 6783, employed in the factories and in the productive fishery of Lake Pleshtcheiff.

PEREZ, ANTONIO, minister of Philip II. of Spain, was born in Aragon in 1539. His father was Secretary of State under Charles I. and Philip II., and he himself was appointed to this office when only 25 years of age, and acquired the entire confidence of the king. Don Juan D'Austria, having sent his confidant, Juan de Escovedo, to Spain, to solicit aid against the party of Orange; and Escovedo having rendered himself an object of hatred both to the king and to P., the former resolved to put him out of the way by murder, and intrusted P. with the accomplishment of this design, which P., to gratify his own revenge, accomplished accordingly, 31st March 1578. The family of Escovedo denounced P. as the murderer, and all his enemies joined against him. The king at first sought to shield him; but in July 1581 he was arrested, and by torture forced to confess. He succeeded, however, in making his escape to Aragon, where he put himself under protection of its laws. After a long and severe inquiry into his conduct, he was found guilty of many acts of fraud and corruption, and condemned to death in Madrid; but the *Justicia Mayor*, or highest court of justice in Saragossa, refused to deliver him up. The king applied for aid in May 1591 to the Inquisition, and the Aragonese court delivered him up to its agents, but the people rose in tumult, and liberated him. This happened repeatedly; and at last, in September 1591, Philip II. entered Aragon with an army powerful enough to subdue all opposition, abolished the old constitutional privileges of the country, and caused a number of the principal people to be executed. P., however, made his escape, avoiding the many plots which the king laid for his assassination. He was condemned in Spain as a heretic, but was treated with great kindness in Paris and London. He spent the latter years of his life in Paris, and died there in 1611 in great poverty. P. wrote an account of his misfortunes, which was published at Paris in 1598, under the title of *Relaciones*.

PERFECTIBILITY OF CHRISTIANS, a doctrine held by the Wesleyan Methodists (see **METHODISTS**) of a *Christian perfection* attainable in this life. It is not a perfection of *justification*, but a perfection of *sanctification*; which John Wesley, in a sermon on Christian Perfection, from the text Heb. vi. 1, 'Let us go on to perfection,' earnestly contends for as attainable in this life by believers, by arguments founded chiefly on the commandments and promises of Scripture concerning sanctification; guarding his doctrine, however, by saying that it is neither an *angelic* nor an *Adamic* perfection, and does not exclude ignorance and error of judgment, with consequent wrong affections, such as 'needless fear or ill-grounded hope, unreasonable love, or unreasonable aversion.' He admits, also, that even in

this sense it is a rare attainment, but asserts that 'several persons have enjoyed this blessing, without interruption, for many years, several enjoy it at this day, and not a few have enjoyed it unto their death, as they have declared with their latest breath, calmly witnessing that God had saved them from all sin, till their spirit returned to God.' Concerning all which, the general belief of Protestant Christians is, that these persons were merely more self-complacent and less sensible of their own corruptions than is usual, and that the commands and promises concerning sanctification are all susceptible of an explanation consistent with remaining corruption in believers, and a need of further sanctification, or a continued going on unto perfection whilst this life endures.

That perfection is attainable in this life, is held by the Franciscans, Jesuits, and Molinists in the Church of Rome, but denied by the Dominicans and Jansenists. In advocating the doctrine, its Roman Catholic supporters generally rest much on the distinction between mortal and venial sins.

PERFORMANCE OF CONTRACTS is one of the modes of satisfying the contract, which may be either by doing some specific thing, or not doing something, or by payment of money. It is a good answer to any action brought by one party against another for breach of contract, that what was contracted for has been already performed.

PERFUMERY, PERFUMES (Fr. *parfum*, from Lat. *fumus*, smoke or vapour), delicate fumes or smells. Perfumes are of three distinct classes when derived from plants, and there is a fourth class, which are of animal origin.

CLASS I.—These are the most ancient, and have been in use from the earliest period of which there is record. They consist of the various odoriferous gum-resins, which exude naturally from the trees which yield them; and to increase the produce, the plants are often purposely wounded. The most important are benzoin, olibanum, myrrh, and camphor. No less than 5000 cwt. of these together are annually imported into Britain. Gum-resins form the chief ingredients in 'Incense,' (q. v.), and in Pastilles (q. v.).

CLASS II. are those perfumes which are procured by distillation. As soon as the Greeks and the Romans learned the use of the still, which was an invention imported by them from Egypt, they quickly adapted it to the separation of the odorous principle from the numerous fragrance-bearing plants which are indigenous to Greece and Italy. An essential oil or otto thus procured from orange-flowers bears in commerce to this day the name of Neroly, supposed to be so named after the Emperor Nero. Long before that time, however, fragrant waters were in use in Arabia. Odour-bearing plants contain the fragrant principle in minute glands or sacs; these are found sometimes in the rind of the fruit, as the lemon and orange; in others, it is in the leaves, as sage, mint, and thyme; in wood, as rosewood and sandal-wood; in the bark, as cassia and cinnamon; in seeds, as caraway and nutmeg. These glands or bags of fragrance may be plainly seen in a thin cut stratum of orange-peel; so also in a bay leaf, if it be held up to the sunlight, all the oil cells may be seen like specks. All these fragrant-bearing substances yield by distillation an essential oil peculiar to each; thus is procured oil of patchouly from the leaves of the patchouly plant, *Pogostemon patchouly*, a native of Burmah; oil of caraway, from the caraway seed; oil of geranium, from the leaves of the *Geranium rosea*; oil of lemon, from

blossoms are infused in it for several hours. Fresh flowers being procured, the spent blossoms are strained away, and new flowers added repeatedly, so long as they can be procured. The *bain marie* is used in order to prevent the grease becoming too

maceration. In the engraving a *châsse en fer* (2, fig. 1) is shewn; this is for enfleurage of oil. In the place of glass, the space is filled with a wire net; on which is laid a *molleton*, or thick cotton fabric—moleskin, soaked with oil; on this the flowers are laid, just as with solid grease. In due time—that is, after repeated changing the flowers—the oil becomes fragrant, and it is then pressed out of the moleskin cloth. Oil of jasmine, tuberose, &c., are prepared in this way. In order now to obtain the perfume of these flowers in the form used for scenting handkerchiefs, we have only to infuse the scented fat or oil, made by any of the above methods, in strong alcohol.

In extracting the odour from solid fat it has to be chopped up fine as suet is chopped, put into the spirit, and left to infuse for about a month. In the case of scented oil it has to be repeatedly agitated with the spirit. The result is, that the spirit extracts all the odour, becoming itself 'perfume,' while the grease again becomes odourless; thus is procured the essence of jasmine, essence of orange flowers, essence of violets, and others already named, rose, tuberose, acacia, and jonquil.

It is remarkable that these flowers yield perfumes which, either separate or mixed in various proportions, are the types of nearly all flower odours, thus, when jasmine and orange flowers are blended, the scent produced is like sweet-pea; when jasmine and tuberose are mixed, the perfume is that of the hyacinth. Violet and tuberose resemble lily of the valley. All the various bouquets and nosegays, such as 'frangipanni,' 'white roses,' 'sweet daphne,' are made upon this principle.

The commercial importance of this branch of perfumes may be indicated by the quantity of flowers annually grown in the district of the Var. Flower Harvest: orange blossoms, 1,475,000 lbs., roses, 530,000 lbs.; jasmine, 100,000 lbs.; violets, 75,000 lbs.; acacia, 45,000 lbs.; geranium, 30,000 lbs.; tuberose, 24,000 lbs.; jonquil, 5000 lbs.

CLASS IV. Perfumes of animal origin.—The principal are Musk (q. v.), Ambergris (q. v.), Civet (q. v.), and Castor (q. v.). The aroma of musk is the most universally admired of all perfumes. It freely imparts odour to every body with which it is in contact. Its power to impart odour is such, that polished steel will become fragrant of it if the metal be shut in a box where there is musk, contact not being necessary.

In perfumery manufacture, musk is mixed with other odorous bodies to give permanence to a scent. The usual statement as to the length of time that musk continues to give out odour has been called in question. If fine musk be spread in thin layers upon any surface, and fully exposed to a changing current of air, all fragrance, it is said, will be gone in from six to twelve months.

Civet is exceedingly potent as an odour, and when pure, and smelled at in the bulk of an ounce or so, is utterly insupportable from its nauseousness. In this respect it exceeds musk. When, however, civet is diluted so as to offer but minute quantities to the olfactories, then its perfume is generally admitted; this is so with gas-tar; but the fragrant principle is the same as that breathed by the beautiful narcissus. Castor is in our day almost obsolete as a perfume.

The average importation of musk per annum for the past five years is 9388 ounces, value £10,688. export 1578 ounces, value £2143; leaving for home-consumption every year 7810 ounces, value £8545. Average importation per annum for the past five years: otto of roses 1117 ounces, value £13,561; vanilla 3525 pounds, value £12,568; ambergris 225

Fig. 1.

1, *Châsse en Verre*; 2, *Châsse en Fer*.

hot from exposure to the naked fire; so long as the grease is fluid, it is warm enough. Oil does not require to be warmed, but improved results are obtained when it is slightly heated.

Jasmine and tuberose produce best perfumed grease by enfleurage, but rose, orange, and acacia

2

Fig. 2.

1, *Bain Marie*; 2, *Section of Bain Marie*.

give more satisfactory products by maceration; while violet and jonquil grease is best obtained by the joint processes—enfleurage followed by

surface on which the lymph is deposited to that which would be produced by suddenly separating two flat pieces of wood between which a thin layer of butter had been compressed. Dr Watson regards the appearance as more like the rough side of pieces of uncooked tripe than anything else; while others have compared it to lace-work, cut sponge, a honey-comb, a congeries of earthworms, &c. When the patient dies at a more advanced stage of the disease—viz., soon after the whole of the membrane has become adherent—infinitesimal blood-vessels, in the form of red points and branching lines, are seen, indicating that organisation is commencing in the deposit, which if death had not ensued would have been finally converted into cellular or areolar tissue, and have occasioned the complete obliteration of the pericardial cavity.

The symptoms of pericarditis are pain in the situation of the heart, increased by a full inspiration, by pressure upon or between the ribs in the cardiac region, and especially by pressure upwards against the diaphragm by thrusting the fingers beneath the cartilages of the false ribs; palpitations; a dry cough and hurried respiration; discomfort or pain on lying on the left side; restlessness; great anxiety of countenance; and sometimes delirium. The pulse usually beats from 110 to 120 in a minute, and is sometimes intermittent; and febrile symptoms are always present. These symptoms are seldom collectively present in any individual case, and until the time of Louis the diagnosis of this disease was uncertain and obscure. The physical signs, dependent on the anatomical changes which have been described, are, however, generally so distinct that by their aid the disease can be readily detected. They are three in number. 1. In consequence of irritation propagated to the muscular tissue of the heart at the commencement of the inflammation of its investing membrane, the ventricles contract with increased force, rendering the sounds of the heart louder and its impulse stronger than in health, or than in the more advanced stages of the disease. 2. When much fluid is effused into the pericardium, dulness on percussion is always observable to a greater degree than in health. This sign, which is very characteristic, is seldom perceived till the disease has continued for two or three days. In relation to this increased dulness, we must premise that in the healthy condition of the heart and lungs there is an irregular roundish space with a diameter of somewhat less than two inches, extending from the sternum (or breast-bone) between the level of the fourth and fifth ribs towards the left nipple, in which a portion of the surface of the heart is not overlapped by the lungs, but lies in contact with the walls of the chest. This space should normally be dull on percussion. In pericarditis the extent of the dulness beyond the normal limit indicates the amount of effusion. In extreme cases the dulness may extend over a space whose diameter is seven inches or more. Simultaneous with the increased dulness, there is a diminution of the heart's sounds in consequence of the intervening fluid, and the impulse is often scarcely perceptible. 3. The rubbing of the inflamed and roughened surfaces upon each other gives rise to a sound which is commonly called the *friction sound*, but which has received various names. Thus Dr Watson calls it a *to and fro* sound, and observes regarding its variations that, 'like all the other morbid sounds heard within the chest, it is capable of much variety in tone and degree. Sometimes it very closely resembles the noise made by a saw in cutting through a board; sometimes it is more like that occasioned by the action of a file or of a rasp; but its essential character is that of *alternate rubbing*; it is a *to and fro*

sound.' This sound is heard early in the disease, before the surfaces of the pericardium are separated by the effusion of fluid; and it is due either to the dryness of the membrane, or to its roughness from the deposition of lymph. When the contiguous surfaces are either separated by fluid, or become adherent, the sound disappears; but when it has been lost from the first of these causes, it reappears after the fluid has been so far absorbed as to permit the surfaces again to come in contact. But here, again, its duration is brief, for the surfaces soon become adherent and cease to rub upon each other.

Pericarditis is a disease which occasionally runs a very rapid course, and terminates fatally in forty-eight hours or less. In ordinary cases, however, which terminate in apparent recovery, the disease generally begins to yield in a week or ten days, and excepting that adhesion remains, the cure appears to be complete in three weeks or less. But although these patients *apparently* recover, the pericardial adhesion commonly occasions other structural changes of the heart sooner or later to develop themselves; and in those cases that the physician has the opportunity of subsequently watching, it is observed that fatal disease of the heart, primarily due to the pericarditis, almost always supervenes. In slight cases it is probable that a true cure, without adhesion, may take place.

Pericarditis frequently arises from exposure to cold when the body is warm and perspiring. It is no uncommon result of a contaminated state of the blood, such as occurs in the exanthematous diseases, especially scarlatina, and in Bright's disease of the kidney; but beyond all comparison, it is of most frequent occurrence in association with acute Rheumatism (q. v.), of which it forms by far the most dangerous complication.

At the commencement of the disease, blood should be freely taken (if the patient is tolerably robust) from the region of the heart either by cupping or repeated leeching; and at the same time every attempt must be made to get the system under the influence of mercury to the extent of rendering the gums tender and of affecting the breath. Not only should calomel in small doses, and combined with opium with the view of preventing purging, be frequently given, but mercurial ointment should be rubbed into the arm-pits and inner sides of the thighs, and the mouth should be kept slightly sore for some time. After three or four days, if there should be much fluid effusion, a large blister should be applied over the heart; and if the patient is not already under the influence of mercury, the raw surface may be dressed with mercurial ointment. Perfect rest both of body and mind is of essential importance, and all possible causes of excitement should be excluded. The diet should be mild and chiefly farinaceous, and little or no animal food should be allowed till the beginning of convalescence. Cooling drinks are agreeable to the patient, and may be taken freely with advantage throughout the disease.

PERICARDIUM, *THE*, is a conical membranous sac, containing the heart and the commencement of the great vessels, to the extent of about two inches from their origin. It is placed with its apex upwards behind the sternum, and to its left side, in the interval between the pleura—the serous sacs in which the lungs are enclosed; while its base is attached to the diaphragm. It is a fibro-serous membrane, consisting of an external fibrous and an internal serous layer. The fibrous layer is a strong, dense, fibrous membrane; the serous layer invests the heart, and is then reflected on the inner surface of the fibrous layer. Like all serous membranes, it is a closed sac; its inner surface is smooth and

and, during his rule, industry and commerce were in so flourishing a condition, that prosperity was universal in Attica.

At length, in 431 B.C., the long-foreseen and inevitable 'Peloponnesian war' broke out between Athens and Sparta. With the circumstances that led to it we have not here to do, but as it terminated most disastrously for Athens, it is but right to say that P. is not to blame for the result. Had the policy which he recommended been pursued, one can hardly doubt that Athens, with her immense resources, would have been the victor, and not the vanquished, in the struggle. P. himself died in the autumn of 429 B.C., after a lingering sickness. His character has been sufficiently delineated in the outline of his life which we have given. His connection with the brilliant Aspasia (q. v.) is noticed elsewhere.

PERIER, CASIMIR, a celebrated French statesman, was born at Grenoble, in the department of Isere, France, 21st October 1777. His father had enriched himself by mercantile and industrial pursuits, into which he initiated his two elder sons; but Casimir was still studying at the college of the Oratory at Lyon when the revolution broke out. He immediately went to Paris, and there associated himself with his father and elder brother Antoine-Scipion in their endeavours to found a banking company. It is sufficient to notice here that the banking company was firmly established, and became the Bank of France. Casimir was drafted into the army in 1798, and served in an engineering corps till 1801, when he returned to Paris, and resumed the position of coadjutor to his brother. The house of P. prospered greatly under the empire; the peace which followed the events of 1815 aided the development of their plans, and gave a wider scope to their enterprises; and the public regarded with special favour men such as these two brothers, who devoted their abilities and fortunes to foster the growth of public, as well as their own, prosperity. In 1817, P. published three tracts, in which he condemned the financial policy of the ministry. These papers made a lively impression on the public, and led to the return of the author to the Chamber of Deputies by the electors of Paris. P., in his political principles, was essentially a Constitutionalist, equally far removed from absolutism on the one hand, and extreme democracy on the other. The elections of 1824, conducted under government influence, resulted in the ousting of the greater portion of the Constitutionalists. P., however, and a few others of the chiefs of the party retained their seats; but their opposition to the ministerial measures, though constant and unwearied, was quite ineffective; it, however, raised them greatly in public opinion, and secured their re-election in 1827. In this year, P. had the honour of being elected as representative by both the departments of the Seine and Aube. He defended the loyal and sagacious administration of M. de Martignac, whose representations to the king, Charles X., seemed to have the effect of reconciling the royal party to government in conformity with the charter; but the subsequent rule of the Prince de Polignac reduced this hopeful state of affairs to its former critical condition. The revolution (of July 1830), which P., from his experience of that of 1789, had made every endeavour to prevent, now followed, and it only remained for him to render it as bloodless as possible. In this he was successful, through his great influence with the people of Paris. On August 3, he was elected President of the Chamber of Deputies, but resigned this office on the 11th of the same month to become a member of the ministry. When Laffitte became

President of the Council (November 2), P., fearing that the tendencies of the ministry were too revolutionary, resigned office, and resumed the presidency of the Chamber of Deputies. On 13th Mar. 1831, he succeeded Laffitte as minister, and gave his whole attention to the repression of revolution, the maintenance of order at home and of peace abroad, originating the political system known as the *juste milieu* (q. v.). His foreign policy was very successful; he greatly contributed to the maintenance of Belgian independence, the suppression of the Miguelite insurrection in Portugal, the counterbalancing of Austrian influence in Italy, and, in general, to the spread and progress of constitutional liberty both at home and abroad; but the rapid growth of extreme liberalism in France, partly owing to previous encouragement unwittingly afforded by himself, was a source of great annoyance to him. On the outbreak of cholera in Paris, March 1832, P. made the most extraordinary exertions for the enforcement of the necessary sanitary measures; but he was attacked by the disease, and his system being already exhausted by over-exertion, he died, 16th May 1832. No public man in France was ever so generally and sincerely lamented, and a monument to his memory was erected by public subscription in the cemetery of Père-la-Chaise.

PE'RIGEE (Gr. *peri*, near; *gê*, earth), that point in the moon's orbit which is nearest to the earth. The opposite point is the Apogee (q. v.). See MOON.

PÉRIGUEUX, a town of France, capital of the department of Dordogne, and situated on the right bank of the Isle, 68 miles east-north-east of Bordeaux. It consists of the ancient city of P. Proper—which is gloomy in aspect, and has narrow streets, but large and solidly-built houses—and the *Puy St Front*, which, until the year 1240, was a separate and a rival town. In the old town, there are many curious remains of Gothic architecture. The old ramparts have been demolished, and replaced by beautiful and spacious boulevards. The cathedral of St Front is a majestic edifice, restored at the end of the 15th century. Quarries of building-stone are worked in the vicinity, and many hands are employed in cutting and polishing marble. Paper, woollen cloths, cutlery, and hosiery are manufactured. The celebrated *Pâtés de Périgueux*, made of partridges and truffles, are largely made and exported. Pop. 16,422.

P., a town of the highest antiquity, is the *Vernand* mentioned by Caesar. In ancient times, it was a city of much importance. It stood at the junction of five Roman roads, and contained a number of splendid edifices. Close to the modern town are still to be seen the remains of a vast amphitheatre, oval in form, and larger in its dimensions than the ancient amphitheatre of Nîmes. There are also remains of ancient aqueducts, baths, and temples. The *Tour de Véronne* is the most remarkable fragment of Roman architecture. It is still 67 feet high, and appears to have been much higher; is 200 feet in circumference, and has walls 6 feet thick. It has neither doors nor windows. Its purpose is not known.

PERIHELION (Gr. *peri*, and *hêlios*, the sun), that point in its orbit at which a planet is nearest the sun. The point of the orbit opposite to it is called the Aphelion (q. v.). The position of the perihelion, i. e., its longitude east or west of the equinox, is one of the seven elements of a planet's orbit.

PERIM, a small island belonging to Great Britain, situated in the strait of Bab-el-Mandeb, at the entrance to the Red Sea. Lat. of southern

Edinburgh and *Quarterly* were above the mark of preceding reviews, strongly devoted to the interests of conservatism, and, in its early years, somewhat violent in its politics. The review, in the course of time, became the favourite medium for all parties to disseminate their views on political, literary, or theological subjects. Among the most important periodicals of this class, besides the *Edinburgh* and *Quarterly*, are the *Westminster Review*, established 1824, characterised by freedom in handling philosophical and theological topics, and containing essays by J. S. Mill, Carlyle, Grote, John Sterling, and Lord Houghton; the *Dublin Review*, Roman Catholic, founded in 1836; the *North British Review*, which first appeared in *Edinburgh* in 1844; the *National Review*, which began in 1855; and the *Home and Foreign Review*, in 1862 (ceased to appear in 1864). All these periodicals preserve to a great extent the form of their two predecessors, and like them, appear four times in the year. A few reviews have of late appeared monthly, or even weekly: of this last class, the most widely-circulated and influential are the *Athenæum*, established in 1828, and the *Saturday Review*, in 1856. The management of a review is placed in the hands of an editor. Each article has at its head the title of a work or works, which either are directly the subject of the reviewer's criticism, or at least indicate the general subject of the article. Review articles are generally anonymous.

The greater part of magazines or periodicals of a more miscellaneous character appear monthly, and their system of management is somewhat similar to that of reviews; but the articles are generally shorter, the subjects more varied, consisting often of tales and novels, which appear there as serials, continued from number to number. Some of the most popular novels of the present day have first been published in magazines. *Blackwood* was the precursor of various monthly magazines of repute, the most important being *Fraser's Magazine*, established in 1830, which still preserves a high literary character. The usual price of these periodicals is 2s. 6d.; but in 1859 and 1860, several new magazines, *Macmillan's Magazine*, the *Cornhill*, *Temple Bar*, *London Society*, and the *St James's Magazine*, were started at the cheaper price of a shilling, under favourable auspices. In Great Britain there are now many weekly periodicals, chiefly of an instructive and amusing kind, price from a penny to three-pence each. This class of publications received an impetus and proper direction by the issue of *Chambers's Journal* and the *Penny Magazine* of the 'Society for the Diffusion of Useful Knowledge' in 1832. To the first mentioned, which still exists, have since been added *All the Year Round*, conducted by Charles Dickens, and various others enjoying a high degree of popularity. It is customary for the publishers of these weekly sheets to issue them accumulatively in parts monthly under a cover, wherefore they largely answer the purpose of monthly magazines. The rate of payment for writing in the higher class reviews is usually £10, 10s. per sheet of 16 demy 8vo pages; in the weekly periodicals, half a guinea to a guinea per column is ordinarily paid, but in some instances the price paid is very much greater; such particularly is the case as regards novels or stories, given chapter by chapter, through a series of numbers; for some tales in this form the payment amounts to hundreds, if not thousands of pounds—a striking proof of the eager demand for sensational fiction.

At present, there are in Britain about 82 quarterly periodicals, of which hardly more than 16 come under the common idea of a review; many are

devoted to special departments, literary, scientific, commercial, or theological; and some consist of an account of the transactions of particular societies, literary or scientific. About 400 periodicals are published monthly, and from 50 to 100 weekly.

France possessed as far back as 1665 a critical review called the *Journal des Savants*, which, after a lengthened interruption, began again in 1816, and holds a respectable position as a scientific journal. A number of literary and scientific journals sprang up in last century, as the *Nouveau Journal des Savants*, *Journal Littéraire*, *Journal Encyclopédique*, &c. Among the best was the *Magasin Encyclopédique*, begun in 1795, and from 1819 to 1855, combined with the *Revue Encyclopédique*. One of the most noted critical journals in Europe is published in Paris, the *Revue des Deux Mondes*, which began in 1829, and has, since 1831, appeared fortnightly. In it and the other French periodicals of the same kind, the review form is not so completely preserved as with us: a proportion of tales, poetry, &c., is admitted, and the names of the contributors are required to be attached to their articles. The *Revue des Deux Mondes* has had many short-lived imitators, more or less identified with different political parties. The principal French reviews of more recent date are the *Revue Contemporaine*, *Athenæum Français*, and *Revue d'Europe*.

In Germany, reviews have taken even a deeper root than in England. The *Göttinger Gelehrte Anzeige*, which is the oldest publication of the kind, still preserves a high character. German criticism can, however, hardly be said to have begun before the time of Lessing, who, in conjunction with Nicolai of Berlin, established, in 1757, the *Bibliothek der schönen Wissenschaften*, and afterwards various other journals, characterised by an independence of thought unknown before. The *Allgemeine Literaturzeitung*, founded at Jena in 1785, was a periodical of a still higher character, having for contributors the most eminent literary men of the period. When transferred from Jena to Halle, another journal, called the *Jenaische Allgemeine Literaturzeitung*, sprung up at the former place, under the auspices of the celebrated literary circle at Weimar, of whom Goethe was the centre. These two periodicals existed till 1848. Of modern German reviews, the *Literarische Centralblatt*, founded in 1850, is one of the best and most comprehensive. Among periodicals which do not come under the class of reviews, may be mentioned *Das Deutsche Museum* (1851), and *Das Weimarsche Jahrbuch für Deutsche Sprache, Literatur und Kunst*, may be favourably named.

Italy possessed a critical journal, *Giornale di Letterati*, as far back as 1710, conducted by Apostolo Zeno, which continued for 23 years. A new journal of the same name, founded at Pisa in 1771, attained considerable repute. From 1826 to 1830, the *Biblioteca Italiana* and *Antologia di Firenze*, were reviews of considerable ability. The scientific periodicals of Italy are generally creditable. In the dominions of Victor Emmanuel, there are at present 31 literary and scientific, and 10 miscellaneous periodicals.

The United States of America possess a large variety of periodicals, quarterly and monthly, and in a less degree weekly, issuing chiefly from the presses of Boston, New York, and Philadelphia. The most noted critical journal is the *North American Review*, established in 1815. It is to be mentioned with regret that, owing to the want of an international law of Copyright with the United Kingdom, many of the less reputable of the American periodicals systematically incorporate articles without permission or payment from the periodicals of Great Britain—a circumstance tending

not invariably the case. Amongst its other offices, it serves, by isolating the bone from the surrounding tissues, to prevent the spread of disease from them to it. The shin-bone or tibia is thus indebted to the periosteum for its ordinary immunity, in cases of ulcer in that region. In those parts in which the bone is not so completely isolated from the surrounding tissues, as at the ends of the bones of the fingers and toes, inflammation of the soft parts not infrequently extends to the bony structure.

PERIOSTITIS, or INFLAMMATION OF THE PERIOSTEUM, generally occurs on the surface of thinly-covered bones, such as the tibia, clavicles, and cranial bones. Its chief causes are (1) a *sypilitic taint*, in which oval swellings, called *Nodes* (q. v.), are produced; (2) *rheumatism*; and (3) *acropula*. In the two latter cases, there is a periosteal swelling around the whole circumference or surface of the bone. The affection, especially when due to the first or second of the above causes, is usually accompanied with considerable nocturnal pain. If the disease occurs in an acute form, it must be treated with leeches, fomentations, and the other ordinary antiphlogistic (or lowering) remedies. When it becomes chronic, the treatment must be mainly directed to the cause which has originated it. In almost all cases, the nocturnal pains are best relieved by somewhat large doses (five to ten grains) of iodide of potassium, taken three times a day on an empty stomach.

PERIPATE'TIC PHILOSOPHY, a designation of the philosophy of Aristotle (q. v.) and of his followers. It is of doubtful origin, being supposed to have been derived either from his custom of occasionally walking about (*peripatein*) during the delivery of his lectures, or from the place in which they were delivered having been a shaded walk of the Lyceum.

PERIPNEUMO'NIA, an inflammation of the membrane which invests the lungs, accompanied with general disturbance of the whole system; remarkably prevalent among horses in South Africa, in a zone from 20° to 27° S. lat. It is very fatal; and to its prevalence and virulence, Dr Livingstone is disposed to ascribe the fact that horses, although so abundant in the more northern parts of Africa, were unknown in the south till introduced by Europeans; this invisible barrier being more insurmountable than mountain ranges, deserts, or rivers. The season during which peripneumonia prevails is from December to April. Zebras, antelopes and oxen are liable to its attacks, but no kind of quadruped suffers so much from it as the horse. The flesh of animals which die of peripneumonia is unwholesome, and produces a malignant carbuncle in persons who eat it.

PERIPTERAL (Gr. *peri*; and *pteron*, a wing), a term applied to temples or like buildings having columns all round the cells.

PERISTALTIC MOTION. The terms *peristaltic* (Gr. *clasp*ing and *compress*ing) and *vermicular* (or worm-like) are applied to the peculiar motion or action of the muscular coat of the intestines, by which the substances contained within it are regularly moved onward.

This action of the intestines is readily seen on opening an animal (a dog, cat, or rabbit, for example) immediately after it has been killed; and in these circumstances, it is perhaps exaggerated, from the stimulating action of the cold air; and it may be shewn in an abnormally active state, although not altered in character, by subjecting the exposed intestines to the influence of the electro-magnetic machine.

It appears, from the observations made by Brinton,

Todd and Bowman, and others on recently killed animals, that the peristaltic motion commences at the pyloric third of the stomach (see DIGESTION, ORGANS OF), whence successive waves of contraction and relaxation are propagated downwards throughout the whole length of the intestinal canal. In examining a portion of intestine at the moment of its contraction, we perceive a dilatation above it as well as below it; the latter being produced by the protrusion into it of the contents of the now contracted portion of intestine; the former by the relaxation of a previously contracted portion. The rapid succession of these contractions and relaxations gives to the movements of the intestines the appearance of the writhings of a worm, whence they are distinguished by the appellation *vermicular*.—Todd and Bowman's *Physical Anatomy of Man*, vol. ii. p. 236. These movements can occasionally be observed during life in the human subject, indirectly, in cases of extreme attenuation of the abdominal walls, and directly in wounds of the abdomen, and during certain surgical operations. There are differences of opinion as to the cause of the peristaltic action; thus, Todd and Bowman assert that 'the intestinal movements are partly due to the influence of the stimulus of distention upon the muscular tissue, and partly to the reflex action of the ganglia of the intestinal plexus of the sympathetic, stimulated by the contact of the intestinal contents with the mucous membrane,' while Carpenter maintains that 'the intestinal tube from the stomach to the rectum is not dependent upon the nervous centres either for its contractility or for its power of exercising it, but is enabled to propel its contents by its own inherent powers.'

Numerous observations tend to shew that this motion has a nearly definite velocity in each individual. Most commonly the act of defecation takes place with perfect regularity every 24 or more rarely every 12 hours, the quantity discharged being almost constant, if the mode of living does not vary. Heberden (*Commentarii*, p. 14) mentions a person who regularly had a motion once a month, and by way of contrast) another who had twelve motions every day during thirty years, and then seven every day for seven years, and rather grew fat than otherwise. Ponteau (*Œuvres Posthumes*, tome i. p. 27) records the case of a young lady who had no stool for upwards of eight years, although during the last year she ate abundantly of fruit, and drank coffee, milk, and tea, and broth with yolk of egg; but she had copious greasy sweats. Such a case as this is possible, but far from probable.

That the influence of *expectant attention* on the muscular movements of the intestine (and especially of its lower portion) is very great, is shewn in various ways. It is, for the most part, thus that *medicines* operates in producing a readiness for defecation at one special hour in the day, and that bread-pudding and other equally inert substances act on the bowels, if the patient believes them to be purgatives. Dr Carpenter, in his remarks on 'the influence of expectant attention on muscular movements,' in the chapter of his *Human Physiology* treating of 'Muscular Movements,' mentions two very striking cases of the kind which have fallen within his own knowledge.

PERISTYLE, a colonnade around the interior of a courtyard or other building.

PERITONE'UM (Gr. *periteneia*, to extend around), a serous membrane, and like all membranes of this class, a shut sac, which, however, in the female, is not completely closed, as the Fallopian tubes communicate with it by their free extremities. The peritoneum more or less completely invests all the viscera lying in the abdominal and

to be confounded by the well-educated practitioner is a peculiar form of hysteria; but the age and sex of the patient, the presence of hysteria in other forms, and the general history of the patient and of her symptoms, will almost always lead to a correct diagnosis of the disease.

The treatment, in an ordinary case of peritonitis (not arising from mechanical injury, or perforation from disease, or occurring in connection with puerperal fever), consists, if the patient is moderately robust, in bleeding from the arm, till a decided impression has been made on the circulation; after which the abdomen should be covered with twenty or thirty leeches, and the bleeding from their bites should be encouraged by fomenting the belly with flannels wrung out of hot water, or, if the patient can bear its weight, by the application of a light poultice. The system must, at the same time, be got as speedily as possible under the influence of mercury, by the means described in the treatment of Pericarditis (q. v.). Opium may be given freely, not merely to guard against the purgative action of the calomel, but with the view of securing sleep to the patient, and quiet to the inflamed membrane. The patient must be kept on low diet, unless indications of sinking appear. In peritonitis from perforation, the only remedy is opium, which must be given in large and repeated doses, so as to keep the bowels perfectly at rest, in order to promote the formation of adhesion, by which alone the patient can be possibly saved. For the same reason, perfect rest must also be insisted on, and even drinks forbidden, thirst being allayed by the application of ice to the tongue.

Chronic Peritonitis occurs in two forms, which differ in their origin and degree of fatality, but are very similar in their symptoms. In the first, the inflammation is of the ordinary character, and although the disease sometimes originates spontaneously, it is more frequently the sequel of an imperfectly cured acute attack; in the second, it depends upon granules (supposed by Louis and most writers to be tubercles) lying in countless numbers in the serous membrane, and serving as a constant source of irritation. The second form is confined almost, if not entirely, to persons of a scrofulous constitution.

The symptoms of chronic peritonitis are more obscure than those of the acute form. There is abdominal pain, often slight, and not always constant, which is increased by pressure, or sometimes is felt only when pressure is made. The patient complains of a sensation of fulness and tension of the belly, although its size is not visibly increased; of a loss of appetite; and of nausea and vomiting; and the bowels are usually more or less out of order. After a time, the abdomen enlarges, and becomes tympanitic, or more or less filled with fluid; and death gradually ensues from debility and emaciation, unless the fatal issue is accelerated by an acute inflammatory attack.

It is not always easy to determine, during life, whether the disease belongs to the first or second form. When its origin cannot be traced to a preceding acute attack, to local abdominal injury, or to chronic affections of the abdominal viscera, there is strong reason to believe it to be of the granular, or, as it is commonly called, the tubercular form, especially if the general constitution and the hereditary tendencies of the patient point in the same direction.

Little can be done in the way of treatment, especially in the tubercular form, further than mitigating the most distressing symptoms, and possibly retarding the final issue. The frequent application of a few leeches to the abdomen, followed

by warm poultices, occasional blisters, attention to the bowels, which, if costive, should be acted upon by gentle laxatives, and a mild, nourishing, but unstimulating diet, are more likely to be of service than remedies of a more energetic nature.

PERIWINKLE (*Littorina*), a genus of gastropodous molluscs of the order *Pectinibranchiata* and family *Littorinidae*, having a proboscis-shaped head, a foot of moderate size, a single gill, and a rudimentary siphonal canal; the shell turbinate, thick, with few whorls, and no nacreous lining; the operculum of few whorls. A very well-known species is the Common P. (*L. littorea*), a snail-like mollusc most abundant on rocky parts of the British coast, living in the lowest zone of sea-weeds between two marks, and feeding on fuci, &c. It is oviparous. No mollusc is more generally collected and used for food. Children are generally employed in collecting it. It is boiled in the shell, and so sold, often in the streets, and chiefly to the poorer classes, although few molluscs are more pleasant. It is calculated that 1900 tons, value £15,000, are annually consumed in London alone. It is called *Wilk*, *Wail*, or *Whulk* in Scotland, but is quite different from the *Whelk* (q. v.) of the English, notwithstanding the sameness of name. Other species, *L. neritoides*, and *L. rudis*, are common on all rocky parts of the British coasts, but are less esteemed. *L. rudis* is viviparous, and the shells of the young within the mantle of the parent often make it gritty and unpleasant to eat.

PERIWINKLE (*Vinca*), a genus of plants of the natural order *Apocynaceae*, having a 5-cleft calyx and a salver-shaped corolla bearded at the throat, with five obliquely truncated segments. The leaves are opposite and evergreen; the flowers grow singly or in pairs from the axils of the leaves. The Lesser P. (*V. minor*), a native of many parts of Europe, and of the southern parts of Britain, growing in woods and thickets, is a half-shrubby plant with trailing stems, rooting at their extremities, ovate-lanceolate leaves, and pale-blue—sometimes white or reddish-purple—salver-shaped flowers. The Greater P. (*V. major*), which has much larger flowers and ovate-cordate ciliated leaves, is a native of the south of Europe, and is found in a few places in the south of England. Both of these species are very commonly planted in shrubberies and gardens, rapidly cover unsightly objects with pleasing green foliage, and produce their beautiful flowers at almost all seasons of the year, even in winter when the weather is mild. The HERBACEOUS P. (*V. herbacea*), a Hungarian species, is remarkable for the abundance of its flowers. The YELLOW P. (*V. lutea*) is a native of the southern parts of North America. The ROSE-COLOURED P. (*V. rosea*), a native of Madagascar, is a favourite greenhouse plant.—The name P. was formerly *Perwinké*. Chaucer speaks of the 'fresh perwinké rich of hue.' It is probably from the French *perwenche*, and that from the Latin *perua*.

PERJURY is the crime committed by one who, when giving evidence on oath as a witness in a court of justice, or before some constituted authority of the same kind, gives evidence which he knows to be false. But in order to make the giving of the false evidence liable to criminal punishment, it must have been not only false to the knowledge of the witness, but the matter must have been material to the issue raised. If the falsehood occurred as to some trifling or immaterial fact, no crime is committed. Moreover, it is necessary, in proving the crime, that at least two persons should be able to testify to the falsehood of the matter, so that there might be a majority of oaths on the matter—there being then two oaths to one. But this rule is satisfied though

beds, because they must be mined or cut through to reach the Kupferschiefer below. This latter is a marl slate, richly impregnated with copper pyrites, for which it was extensively wrought. It contains numerous beautifully preserved fossil fish belonging to the genera *Palæoniscus*, *Cælacanthus*, *Platysorus*, &c. The strange name of *Rothe-todtliegende* (red dead-layers) was given to a large deposit of red sandstone and conglomerate, by the miners, because the copper obtained from the beds above died out when they reached these red rocks.

The succession of rocks given by Murchison as occurring in Permian, are easily co-related with those of Germany. They are (1), conglomerates and sandstones, containing the remains of plants; (2), red sandstones and shales, with copper ore and vegetable remains; and (3), sandstones, grits, and fossiliferous limestones, with interstratified beds of marl and gypsum, the marls occasionally containing plants, and also seams of impure coal.

In England, the Permian rocks are somewhat extensively developed in Durham, where they have been described by Sedgwick and King. From this county, they continue in a narrow strip bordering the Carboniferous beds down the centre of England, until they are lost near Nottingham. In Cheshire, Shropshire, Stafford, and Warwick, they underlie the salt-bearing triassic rocks. The Durham strata are grouped as follow:

- | | |
|--|-------------------------|
| 1. Concretionary and amorphous limestone, | } = Bunterschiefer. |
| 2. Brecciated and pseudo-brecciated limestone, | |
| 3. Fossiliferous limestone, | } = Zechstein. |
| 4. Compact limestone, | |
| 5. Marl slabs, | } = Kupferschiefer. |
| Inferior various-coloured sandstone, | |
| | } = Rothe-todtliegende. |

The fractured bones and teeth of saurians found in the basement bed of the sixth group, were considered the earliest evidence of the existence of reptiles, until the discovery of the *Archegosaurus* in the Carboniferous rocks.

The known organic remains of this period are neither remarkable nor abundant. Many palæozoic forms became extinct within this period; among them are the remarkable *Sigillaria* and the *Neuropteris* of the coal-beds, the well-known brachiopod, *Producta*, and several genera of heterocerotal fish. Some new forms appear, the most important of which are the labyrinthodont reptiles, which, though beginning in the upper Carboniferous beds, increase in number in the Permian, and reach their maximum development in the succeeding Triassic group.

PERMUTATIONS AND COMBINATIONS. A combination, in Mathematics, is a selection of a number of objects from a given set of objects, without any regard to the order in which they are placed. The objects are called elements, and the combinations are divided into classes, according to the number of elements in each. Let the given elements be the four letters *a, b, c, d*; the binary combinations, or selections of two, are *ab, ac, ad, bc, bd, cd*—six in all, the combinations of three are *abc, abd, acd, bcd*—four in all; while there is only one combination of four, namely, *abcd*.

Permutation, again, has reference to the order of arrangement; thus, the two elements, *a* and *b*, may stand *ab* or *ba*, so that every combination of two gives two permutations; the three elements, *a, b, c*, may stand *abc, acb, bac, bca, cab, cba*, one combination of three thus affording six permutations. The combinations of any order with all their permutations are called the *Variations*. Formulas are given in works of algebra for calculating the

number of permutations or combinations in any given case. Suppose seven lottery-tickets marked 1, 2, 3, to 7, and that two are to be drawn; if it is asked, how many possible pairs of numbers there are, this is a question of the number of combinations of seven elements, two together, which is found to be 21. If we want to know how many times the same seven persons could sit down to table together with a different arrangement each time, this is to ask how many permutations seven objects admit of, and the formula gives, $7 \times 6 \times 5 \times 4 \times 3 \times 2 = 5040$. The theory of probabilities is founded on the laws of combination. Thus, in the case of drawing two tickets out of seven, since there are 21 possible pairs, the chance or probability of drawing any particular pair is 1 in 21, or $\frac{1}{21}$. In working out questions in 'combinations,' advantage is often taken of the fact that whatever number of elements be taken from a group to form a combination, the number left gives the same number of combinations; thus the number of combinations of 10 elements three together, is the same as that of 10 elements seven together, &c.

PERN. See HONEY BUZZARD.

PERNAMBUCO, the most eastern seaport of Brazil, stands at the mouths of the Biberibe and Capebibe, in lat. 8° 4' S., long. 34° 52' W., 80 miles south of Parahiba. It is the greatest sugar-mart in Brazil, and is the third in commercial importance of the cities of the empire. It consists of three portions, connected by roads and bridges—*Recife*, the chief seat of commerce, on a peninsula; *S. Antonio*, the middle district, on an island between the peninsula and the mainland; and *Bon Vista*, on the mainland. The inner harbour, which has a depth of from 10 to 30 feet, is formed by a reef which extends along the coast at a distance of from a quarter to half a mile from the coast. This reef serves the purposes of a breakwater. Opposite the northern extremity of the city, there is an opening in the reef, resembling an artificial cut, and forming a passage of sufficient width to admit of the entrance of vessels drawing 16 feet of water. No port is more easily accessible than the outer harbour of Pernambuco. There is a light-house in the harbour, and it is defended by several forts. Formerly, the city was extremely dirty, the streets unpaved, and much inconvenience was suffered from want of a proper supply of water. Of late years, however, many improvements have been introduced; water-works have been erected, extensive and spacious quays formed along the margins of the rivers, and the streets have, in most instances, been paved and lighted. Numerous *collegios* and other educational institutions have been established, and the growing wealth and commercial prosperity of the city has been accompanied by an increasing degree of comfort and refinement. The principal exports are sugar, cotton, rum, hides, and dye-woods. In 1859, 654,642 tons of sugar were exported. The imports are woollen and cotton cloths, hardware, silks, wines, and flour. Pop. from 80,000 to 100,000.

PERNAMBUCO, a maritime province of Brazil, is bounded on the south-east by Bahia and Alagoas, and on the north-west by Piauhí, Ceará, and Parahiba. It contains 61,068 square miles and has a population of 950,000. The coast is flat, and fringed with coral reefs, which render navigation dangerous. The chief river is the San Francisco, which forms the southern boundary, and includes the greater portion of the area of the province in its basin. The banks of this river comprise many rich, expansive meadows, and here the cattle are reared which, in the form of beef and hides, form an important article of export at the

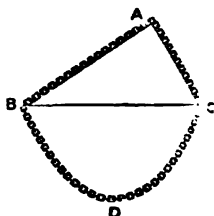
these towers every possible approach could be commanded, which to a great extent is true; but it must be also remembered that the greater space a gun commands, by so much the more is it raised above the plain, and rendered visible. These towers would have little chance against the rifled ordnance of the present day. Montalembert's system was violently attacked by the French engineers, but Carnot subsequently adopted it, with some modifications, and it enters largely into the modern German defensive works. The system has never, however, found favour with British engineers.

PERPETUAL CURE, a form of ecclesiastical benefice which grew out of the abuse of lay Impropriation (q. v.), the impropriator appointing a clergyman to discharge the spiritual functions of which he himself was not capable. The substituted clergyman, in ordinary cases, is appointed by the bishop, and called a vicar; but when no provision is made for a vicar, the impropriator appoints the clergyman, who is called a perpetual curate. The perpetual curate enters on his office without induction or institution, and requires only the bishop's licence. Perpetual cures are also created by the erection and endowment of a chapel subject to the principal church of a parish. Such cures, however, are not benefices, unless endowed out of the fund called Queen Anne's Bounty. Churches so endowed are, by 2 and 3 Vict. c. 49, recognised as benefices. The district churches which have been erected under several recent acts are made perpetual cures, and their incumbents are corporations.

PERPETUAL MOTION, THE. According to Newton's First Law (see MOTION, LAWS OF), all unresisted motion continues for ever unchanged. Thus, if friction could be avoided, a top or a gyroscope spinning in vacuo is an instance of motion which would be unchanged for ever, and which, therefore, might be called perpetual. The motion of the sun in space, the earth's rotation about its axis, and numerous other common motions, are in this popular sense perpetual. [It is necessary to remark here, that even these motions are subject to retardation; for instance, those of the bodies of the solar system, by the resistance of the luminiferous medium, which we know to be matter, and which fills all space. This was remarked by Newton himself, for he says, 'the larger bodies, planets and comets, preserve their motions longer (than terrestrial objects), because they move in less resisting media.' The same cause influences the motion of the gyroscope, but in its case there is another retarding influence at work, due to the production of electric currents by the magnetism of the earth.] But this is not what is technically understood by the title *The Perpetual Motion*. It means an engine which, without any supply of power from without, can not only maintain its own motion for ever, or as long as its materials last, but can also be applied to drive machinery, and therefore to do external work. In other words, it means a device for creating power or energy without corresponding expenditure. This is now known to be absolutely impossible, no matter what physical forces be employed. In fact, the modern physical axiom, the Conservation of Energy, (see FORCE), founded on experimental basis as certain as those which convince us of the truth of the Laws of Motion, may be expressed, in the negative, thus: *The perpetual motion is impossible*. Helmholtz's beautiful investigations regarding Conservation of Energy (referred to in FORCE), are founded on this axiom. So is the recent application, by Clausius, of Carnot's remarkable investigation of the 'Motive-power of Fire' to the true Theory of Heat. Other instances will be mentioned at the end of the article.

The complete statement of the impossibility of procuring the perpetual motion with the ordinary mechanical arrangements, in which it was most commonly sought, is to be found in the *Principia* (q. v.), as a deduction from Newton's Third Law of Motion. The equivalent principle of Conservation of Energy is there stated in a manner which leaves nothing to be desired; although not given in anything like the modern phraseology. Yet it is usually said, in works on the Perpetual Motion, that De La Hire (in 1678) gave the first proof of its impossibility in ordinary mechanics. This proof, published long after Newton's, is by no means so complete, as it exposes only some of the more patent absurdities which had been propounded for the solution of the problem. It is certain, and worthy of particular notice, that Newton was far in advance of the greatest of his contemporaries and their immediate successors, in even the fundamental notions of mechanics. Thus, we find John Bernoulli seriously propounding a form of the perpetual motion, depending upon the alternate mixture, and separation by a filter, of two liquids of different densities; an arrangement which is as preposterous as the very common suggestion of a water-wheel which should pump up its own supply of water; and whose absurdity must be evident to any one acquainted with Newton's chapter on the Laws of Motion.

It is curious that, long before Newton's time, the physical axiom, that the perpetual motion is impossible, was assumed by Stevinus as a foundation for the science of Statics. This is particularly interesting when we compare it with the magnificent discoveries which have been evolved in our own day from the same principle applied to the physical forces generally, and not to gravitation alone, as contemplated by Stevinus. His process is as follows: Let an endless chain of uniform weight be passed round a smooth triangular prism ABC, of which the face BC is horizontal. The free portion of the chain BDC will hang in a symmetrical curve (CATEYARY, q. v.), and its tension will therefore be the same at B and at C. Hence the other portion BAC of the chain will be free to move, unless the resolved part of the weight of AB, acting down the inclined plane AB, just balance that of the corresponding portion of the chain down AC. If these balance, the parallelogram of forces is proved; if not, one side will preponderate, and we shall evidently obtain the perpetual motion.



We will briefly sketch the history of the simpler part of the problem, where mechanical and hydrostatical arrangements alone are contemplated, and where the impossibility of procuring the perpetual motion had been completely shewn by Newton.

The leading features of the various devices suggested as self-moving engines are three: 1. The machine being a combination of mechanical powers driven by weights, was to be constructed so as constantly to wind up those weights as they fell, and therefore to be constantly in the same circumstances as to power in each successive complete revolution. The ideal of this, in its simplest form, is that of a wheel moving about a horizontal axis, and so adjusting certain heavy sliding pieces on its surface, as to have always a preponderance on one particular side. 2. The type of the second class differs from that of the first only in the substitution of liquids for the weights in the first class, and the consequent introduction (often in most extravagant forms) of

PERPETUAL MOTION.

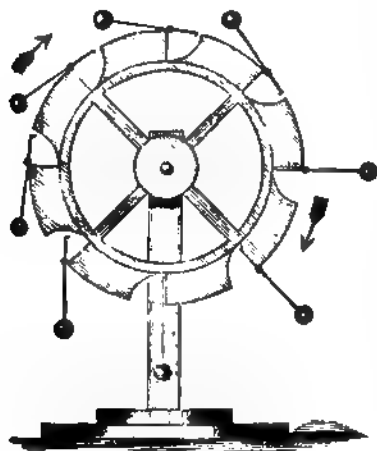
hydrostatical laws, which the inventors seem to have considered less certain and more pliable than the stern facts of common mechanics. 3. The machine depends on some natural power, such as rain, change of temperature, wind, fluctuations of the barometer, &c. The consideration of this third class is very interesting, but we will defer it for a little.

Of the first class, the only machines that seem ever to have succeeded in permanently deceiving any of their inventors are those of the Marquis of Worcester and of Councillor Orffyreus. Contemporary with the former was Bishop Wilkins, who candidly and ingenuously points out the fallacies of various devices of his own, depending severally on weights, on magnets, and on Archimedes's screw. His first attempt seems to have been closely allied to that of the Marquis of Worcester, of whose engine we have no drawing, and only a very vague description. The following figures give us, however, some

In all three, the attempt is by the sliding of the balls in their cells, or by the turning of the levers to give the preponderance to the descending side of

Bishop Wilkins's First Form.

motion of its probable nature. The first is one of Wilkins's, the second that of Jackson, the third that



Jackson's Perpetual Motion.

of Martin. Their construction is evident from the figure.

Martin's Perpetual Motion.

the wheel. But even the cuts shew that, though the weights on the descending side are on the whole further from the axis of the wheel than those on the ascending side, yet there are more balls on the latter than on the former side, and a careful examination, like that made by Wilkins, shews that their moments in opposite directions about the axis balance each other. With reference to the invention of the Marquis of Worcester—who is otherwise well known as one of the first to foresee, and even in part to realise experimentally, the advantage of steam as a motive-power—we find the following in his *Century of Inventions*: ‘*An Advantageous Change of Centers.*—To provide and make that all y^e weights of y^e descending syde of a wheele shal be perpetually further from y^e center, then those of y^e mounting syde, and yett equal in number and heft of y^e one syde as y^e other. A most incredible thing if not seene, butt tryed before y^e late King of happy and glorious memorye in y^e Tower by my directions, two Extraordinary Embassadors accompanying his Ma^{ty} and y^e D. of Richmond, D. Hamilton, and most part of y^e Court attending him. The wheele was 14 foote ouer, and 40 weights of 50 p^l apiece; Sr Wm. Belford, then Lieu^t of y^e Tower, and yett living can justify it with severall others; They all saw that noe sooner these great weights passed y^e Diameter Line of y^e vpper syde but they hung a foote further from y^e center, nor no sooner passed the Diameter Line of the lower syde, butt they hung a foote nearer; bee pleased to judge y^e consequence.”

The machine of Orffyreus, by which '8 Gravesande was completely taken in, so much so that he wrote to Newton expressing his belief that the perpetual motion was really found, consisted of a large wheel or drum covered with canvas, to prevent the interior from being seen, and rotating about a thick horizontal axle. This machine, when set agoing in either direction, moved with accelerated speed till it reached a rate of twenty-five turns in a minute; and on one occasion was scaled up by the Elector of Cassel for two months, and at the expiration of that time found to be moving as rapidly as ever. This, like the celebrated automaton chess-player, was evidently a case of clever imposition; and but for its strange effect

* See Harleian MS., No. 2423, in the British Museum.

PERPETUAL MOTION.

on 'S Gravesande, would probably have been forgotten long ago. Tricks of this kind, more or less ingenious, such as that of Spence of Linlithgow (1818), which many of our readers may recollect, are still common, especially in America.

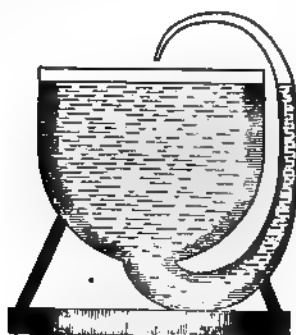
Bishop Wilkins's third form is a good example of the second class of contrivances above mentioned. Its construction will be readily understood

remove or annihilate (without expenditure of work) the action of the loadstone during the descent. Unfortunately, the law of magnetic attraction is the

Bishop Wilkins's Third Form.

from the annexed cut. The water-wheels, driven by the descending water, are intended to turn the Archimedeian screw, so as constantly to replenish the tank above. Wilkins's calm investigation of the reasons why his device will not succeed, is very interesting and creditable.

As a contrast, let us take a case of special absurdity, that of Norwood. In the figure, it is supposed that, as the weight of the water or



Norwood's Perpetual Motion.

mercury in the large vessel immensely exceeds that in the neck, it will preponderate, and drive the liquid through the spout into the vessel again; thereby furnishing, not only an admirable perpetual motion, but a conclusive disproof of one of the fundamental laws of Hydrostatics.

The second of Wilkins's cases is an instructive one. It depends on magnetism, and will be readily understood from the cut. *AB* is a loadstone, which draws the iron ball *C* up the inclined plane to *E*, where there is a hole through which the ball falls down the curved incline, pushes open a trap at *F*, and is dragged again up the plane by the loadstone. The error of this is the neglect of the action of the loadstone on the falling ball. There would be an admirable case of the perpetual motion if we could

Bishop Wilkins's Second Form.

same as that of gravitation, and what is impossible with the one, must be equally so with the other. A good illustration of this is *Addeley's Perpetual Motion*, represented in the annexed sketch. The spokes projecting from the wheel are magnets, whose south poles are all turned from the centre. These are attracted by the north poles (*N*), and



Addeley's Perpetual Motion.

repelled by the south poles (*S*) of four fixed magnets; and blocks of wood (*A*) are interposed, to prevent magnetic action where it would tend to stop the machine! If it were possible to find a substance which would deal with gravitation or magnetism as an opaque body does with light (casting a shadow), the perpetual motion would be obtained with the greatest ease.

It would be tedious and unprofitable to go through the various physical forces, shewing how a misconception of their laws has led to hundreds of patented schemes for the production of perpetual motion. We may merely hint at magneto-electric machines turned by electro-magnetic engines, to which they supply the electric currents; electric machines, driven by a gas-engine, the fuel for which is supplied by the decomposition of water by the electricity produced, &c.; the absurdity of all of which may be imagined from the perfectly analogous case of a steam-engine to which heat might be supposed to

defeated by the existing law, but in consequence of so conspicuous an attempt, an act of parliament was passed, called the Thellusson Act (39 and 40 Geo. III. c. 98), which in future forbids the accumulation of income for any longer time than the life of the grantor or settler, or 21 years from his death. In Scotland, so far from the above doctrines having been early adopted, the contrary doctrine was established. See ENTAIL.

PERPIGNAN, a town of France, and a fortress of the first rank, capital of the department of Pyrénées-Orientales, on the right bank of the river Tet, 5 miles from the Mediterranean, and 40 miles by railway south of Narbonne. It commands the passage by the Eastern Pyrenees from Spain into France, and is defended on the south by a citadel and by ramparts flanked with bastions, and protected by raised works. The works underwent a thorough repair in 1823, and P. now ranks as one of the first strongholds in France. Its appearance is exceedingly picturesque. From a distance, its houses are seen in the midst of a forest of orchards; and a closer examination shews a collection of narrow streets, covered with awnings; houses of semi-Moresque construction, with wooden balconies and courts, and other evidences of Spanish influence. The cathedral, a massive building, begun in 1324; the belfry of St Jacques and the Castiller (now used as a military prison), with its battlements and machicolations, give character to the town. P. contains barracks for 5000 men, a council-house, palace of justice, mint, a college, numerous schools, museums, and scientific societies. Good *vin ordinaire* (red) is grown in the vicinity; woollen cloths, playing-cards, leather, &c., are manufactured, and there is a good trade in wine, brandy, wool, and silk. Pop. 18,199.

P., as capital of the former county of Roussillon, remained long in the hands of the kings of Aragon, and in 1349, King Pedro founded a university here. In 1642, it was taken by Louis XIII.; and since that time, the town itself, together with the county of Roussillon, has remained in the possession of the French.

PERRAULT, CHARLES, a French writer, born at Paris, 12th January 1628, was the son of an advocate, and received a good education. In 1651, he became a member of the Paris bar, and obtained a considerable measure of success as a pleader; but having made the acquaintance of the minister Colbert, he was ere long diverted from the practice of his profession by receiving the appointment of Controller-general of the Royal Buildings. In 1671, the influence of Colbert procured for him an entrance into the French Academy, into which learned body he introduced several important reforms. What first made his name well known was his famous controversy with Boileau regarding the comparative merits of the ancients and moderns, which originated in a poem of P.'s, entitled *Le Siècle de Louis le Grand*, read before his confrères of the Academy, and intended to prove that modern authors were superior to Homer, Herodotus, Plato, Aristotle, Virgil, &c. It was followed up by an elaborate and methodically written *Parallèle des Anciens et des Modernes* (4 vols. 1688—1698), which, though an able and learned performance, is a complete failure in its logic. Boileau was his keenest opponent, and fiercely, not to say rudely, assailed him in his *Réflexions sur Longin*, to which P. replied with equal acrimony, but not with equal wit, in his *Apologie des Femmes* (1694). One good effect of this quarrel was to turn P.'s attention still more closely and critically to his contemporaries, the result of which was an admirable work, *Hommes*

Illustres du Siècle de Louis XIV., containing 200 critical biographies. But the work that has far more than any other preserved his name is his *Contes des Fées*, or Fairy Tales. See NOVELS. The grace, liveliness, and ingenious child-like fancy displayed in these charming compositions, are beyond all praise, and when we remember that their author was far advanced in years when he wrote them, the feat seems miraculous. 'Second childhood' is not always so like the 'first,' as that of P. seems to have been. P. died 16th May 1703.

PERRY, an agreeable beverage made by fermenting the juice of pears. It is extensively made in Worcestershire, Gloucestershire, Herefordshire, and Devonshire, and forms, with cider, the chief diet-drink of those districts. It contains from five to nine per cent. of alcohol. The best pears for making perry are those which from their rough taste are least agreeable for eating.

PER'SEA. See AVOCADO PEAR.

PERSECUTIONS, THE TEN, of the Christian Church, is the name by which are known in ecclesiastical history certain periods of special severity exercised towards the rising community of Christians, for the purpose of compelling them to renounce their new creed, and to conform to the established religion of the empire. The Christian community were at all times regarded with suspicion and dislike in the Roman empire—the constitution of Rome not only being essentially intolerant of those new religions which, like the Christian, were directly aggressive against the established religion of the state, but being particularly hostile to private associations and private assemblages for worship, such as those which every Christian congregation by its very nature presented; and thus there are very few periods, during the first three centuries, in which it can be said that the church enjoyed everywhere a complete immunity from persecution. But the name is given particularly to certain periods when either new enactments were passed against Christianity, or the existing ones were enforced with unusual rigour. The notion of *ten* such periods is commonly accepted almost as an historical axiom; and it is not generally known that this precise determination of the number is comparatively recent. In the 4th c., no settled theory of the number of persecutions seems to have been adopted. Lactantius reckons up but six; Eusebius does not state what the number was, but his narrative supplies data for nine. Sulpicius Severus, in the 5th c., is the first who expressly states the number at *ten*; but he only enumerates nine in detail, and in completing the number to ten, he adds the general persecution which, at the coming of Antichrist, is to precede the end of the world. The fixing of ten as the number seems to have originated in a mystic allusion to the ten horns of the beast in the Apocalypse (xvii. 12).

It need hardly be said, however, that this is only a question of words, the diversity of enumeration arising from the different notions attached by the several historians to the designation *general*. If taken quite strictly to comprise the entire Roman empire, the number must fall below ten; if used more loosely of local persecutions, the number might be very largely increased. The ten persecutions commonly regarded as general are the following: the persecution under Nero, 64 A.D.; under Domitian, 95 A.D.; under Trajan, 107 A.D.; under Hadrian, 125 A.D.; under Marcus Aurelius, 165 A.D.; under Septimius Severus, 202 A.D.; under Maximinus, 235 A.D.; under Decius, 249 A.D.; under Valerianus, 257 A.D.; under Diocletian, 303 A.D. The extent and the duration of some of these have been the subject of

PERSEPOLIS.

considerable controversy and indeed an animated discussion was maintained for a long period as to the probable total number of victims in the pagan persecutions of the church. Such controversies are beyond the scope of this publication. It is quite certain that there have been exaggerations on the Christian as well as on the adverse side; but it has been shewn beyond the possibility of doubt, and the most recent explorations have confirmed the arguments, that the data on which the estimates of Dodwell and Gibbon, the most prominent advocates of the theory of the small number, were founded, were uncertain, and even fallacious; and that, not to speak of the many victims of the constantly recurring local violence, the number who fell in each of the above-named persecutions was both large in itself, and spread, in most cases, over a considerable extent of the Roman empire. The most violent, as well as the most widely-spread of these persecutions, were those under Nero, Trajan, Maximinus, Decius, and Diocletian. The last-named, though called by Diocletian's name, was in reality far less the work of that emperor than of his colleague Galerius; but it was extremely cruel, and, with occasional interruptions, continued from the year 303 down to the victory of Constantine over Maxentius—a period of nearly ten years.

PERSEPOLIS (Persian City), the Greek translation of the lost name of the capital of ancient Persia (*Parsa-Karta*), was situated on the river Araxe (Bendemir), to the east of the river Medus (Polwat, or River of Murghab), in the plain of Marduht, about 35 miles to the north-east of

Shiraz, on the road to Ispahan. A certain number of most remarkable ruins is all that now remains of that city, with which, according to ancient writers, 'no other city could be compared either in beauty or in wealth,' and which was generally designated 'The Glory of the East.' Darius Hystaspes, Xerxes, Artaxerxes, and other Achæmenides, each in his turn contributed towards its aggrandisement. Alexander the Great, in his march of conquest, is said to have destroyed P. completely; but this must probably only be understood to apply to some of the chief palaces. It may also be presumed that after the fall of the Achæmenides, that extension of the original town (afterwards known, and important in history up to within a recent period, as Istakhar), on which were situated the royal edifices and temples used as the royal treasuries up to the time of Epiphanes, gradually fell into decay. The situation of these structures, overlooking the vast luxuriant plain of Marduht, is described in terms of rapturous enthusiasm by every traveller from Chardin to our own day. Three groups are chiefly distinguishable in the vast ruins existing on the spot. First, the Chehel Minâr (Forty Pillars), with the Mountain of the Tombs (Rachmed), also called Takht-i-Jamshîd or the structure of Jamshîd, after some fabulous ancient king, popularly supposed to be the founder of Persepolis. The next in order is Naksh-i-Rustam, to the north-west, with its tombs; and the last, the building called the Haram of Jamshîd. The most important is the first group, situated on a vast terrace of cyclopean masonry at the foot of a lofty mountain-range. The extent of this terrace

Ruins of Persepolis.

(Copied from Fergusson's *Palaces of Nineveh and Persepolis Restored*.)

is about 1500 feet north-by-south, and about 800 east-by-west, and it was, according to Diodorus Siculus, once surrounded by a triple wall of 16, 32, and 60 cubits respectively in height, for the triple purpose of giving strength, inspiring awe, and defence. The whole internal area is further divided into three terraces—the lowest towards the south; the central being 800 feet square, and rising 45 feet above the plain; and the third, the northern, about 550 feet long, and 35 feet high. No traces of structures are to be found on the lowest platform; on the northern, only the so-called 'Propylæa' of Xerxes; but the central platform seems to have been occupied by the foremost structures, which again, however, do not all appear to have stood on the same level. There are distinguished here the so-called 'Great Hall of Xerxes' called (Chehel Minâr, by way of eminence), the Palace of Xerxes, and the Palace of Darius, towering one above the other in successive elevation from the ground. The stone used for the buildings

is dark-gray marble, cut into gigantic square blocks, and in many cases exquisitely polished. The ascent from the plain to the great northern platform is formed by two double flights, the steps of which are nearly 22 feet wide, 3½ inches high, and 15 inches in the tread, so that several travellers have been able to ascend them on horseback. What are called the Propylæa of Xerxes on this platform are two masses of stone-work, which probably formed an entrance-gateway for foot-passengers, paved with gigantic slabs of polished marble. Portals, still standing, bear figures of animals 15 feet high, closely resembling the Assyrian bulls of Nineveh. The building itself, conjectured to have been a hall 82 feet square, is, according to the cuneiform inscriptions, as interpreted by Rawlinson, the work of Xerxes, and reads as follows:

'The great god Auramazda, he it is who has given this world, and who has given life to mankind, who has made Xerxes king, both king and

lawgiver of the people. I am Xerxes the king, the great king, the king of kings, the king of the many-peopled countries, the supporter also of the great world, the son of King Darius, the Achaemenian.

'Says Xerxes the king, by the grace of Auramazda, I have made this gate of entrance; there is many another nobler work besides this Persepolis which I have executed, and which my father has executed;' &c.

An expanse of 162 feet divides this platform from the central one, which still bears many of those columns of the Hall of Xerxes from which the ruins have taken their name. The staircase leading up to the Chehel Minâr, or Forty Pillars, is, if possible, still more magnificent than the first; and the walls are more superbly decorated with sculptures, representing colossal warriors with spears, gigantic bulls, combats with wild beasts, processions and the like; while broken capitals, shafts, pillars, and countless fragments of buildings, with cuneiform inscriptions, cover the whole vast space of this platform, 350 feet from north to south, and 380 from east to west. The Great Hall of Xerxes, perhaps the largest and most magnificent structure the world has ever seen, is computed to have been a rectangle of about 300—350 feet, and to have consequently covered 105,000 square feet, or 2½ acres. The pillars were arranged in four divisions, consisting of a centre group six deep every way, and an advanced body of twelve in two ranks, the same number flanking the centre. Fifteen columns are all that now remain of the number. Their form is very beautiful. Their height is 60 feet, the circumference of the shaft 16, the length from the capital to the torus, 44 feet. The shaft is finely fluted in 52 divisions; at its lower extremity begin a cincture and a torus, the first, two inches in depth, and the latter, one foot, from whence devolves the pedestal, shaped like the cup and leaves of the pendent lotus, the capitals having been surmounted by the double semi-bull. Behind the Hall of Xerxes was the so-called Hall of Hundred Columns, to the south of which are indications of another structure, which Fergusson terms the Central Edifice. Next along the west front stood the Palace of Darius, and to the south the Palace of Xerxes, measuring about 86 feet square, similarly decorated, and of similar grand proportions. —For a further and more minute description, we refer to the travels of Niebuhr, Ker Porter, Rich, and other travellers; to Fergusson's *Palaces of Nineveh and Persepolis Restored*, and to Vaux's *Nineveh and Persepolis*. See also the articles CYRUS, DARIUS, XERXES, CUNEIFORM, and PERSIAN ARCHITECTURE.

PERSEUS, also PERSES, the last king of Macedonia, was the eldest son of Philip V., and was born in the latter part of the 3d c. B.C. He was trained to a military life from his earliest years, and after bringing about the death of his younger brother, Demetrius, who was a favourite both with the Macedonians and the Romans, he succeeded his father on the throne 179 B.C. Philip had long foreseen that a contest between Rome and Macedon was inevitable, and he had carefully prepared for it, so that P., on his accession, found himself fore-armed. Meanwhile, he governed Macedon with great prudence and moderation, and became decidedly popular with his subjects and neighbours. Seleucus IV. (Philopator) gave him his daughter Laodice in marriage; Prusias, the Bithynian king, married his sister; the Greek states looked favourably on his projects, and his envoys were well received even at Carthage. The Romans took the alarm, and—after some delusive negotiations—sent an army into Thessaly (171 B.C.). The war lasted four years; in the first three, the advantages were so little on the side of the Romans, that there was a widespread feeling in P.'s favour in the countries bordering on

the Levant and the Archipelago. In the beginning of the fourth campaign (168 B.C.), L. Æmilius Paulus arrived, and took command of the Roman forces. A great battle was fought at Pydna (June 22), in which the army of P. was utterly routed. The king himself was soon afterwards forced to surrender, and conveyed to Rome, where he adorned the triumph of the conqueror. He died in captivity at Alba, a few years later.

PERSEUS, in Grecian Mythology, the son of Zeus and Danaë (q. v.), and grandson of Acrisius. He was brought up at Seriphos, one of the Cyclades, where Polydectes reigned, who, wishing to get rid of him for private reasons, sent him, when yet a youth, to bring the head of the Gorgon Medusa, on the pretence that he wanted to present it as a bridal gift to Hippodamia. P. set forth under the protection of Athene and Hermes, the former of whom gave him a mirror, by which he could see the monster without looking at her (for that would have changed him into stone); the latter, a sickle; while the nymphs provided him with winged sandals, and a helmet of Hades, or invisible cap. After numerous wonderful adventures, he reached the abode of Medusa, who dwelt near Tartessus, on the coast of the ocean, and succeeded in cutting off her head, which he put into a bag, and carried off. On his return, he visited Ethiopia, where he liberated and married Andromeda, by whom he subsequently had a numerous family, and arrived at Seriphos in time to rescue his mother from the annoyance of the too ardent addresses of Polydectes, whom, along with some of his companions, he changed into stone. After this, he went to Argos, from which Acrisius fled to Thessaly, and P. assumed the vacant throne. But this, like many other details of the myth, is differently narrated. P. was worshipped as a hero in various parts of Greece, and, according to Herodotus, in Egypt too. In ancient works of art, the figure of P. much resembles that of Hermes.

PERSEVERANCE OF SAINTS, a doctrine necessarily resulting from the most essential parts of the Calvinistic system, and therefore held by almost all who adopt the Calvinistic or Augustinian doctrines. It is advocated not only by arguments from other doctrines, as those of election, atonement, the intercession and mediatorial dominion of Christ, imputed righteousness, and regeneration, but also from many texts of Scripture, as those which declare eternal life to be always connected with believing, and those which encourage the believer to depend on the faithfulness, love, and omnipotence of God. To an objection very commonly urged against it, that it tends to make men careless concerning virtue and holiness, its advocates reply, that this objection is only valid against a doctrine very different from theirs, the true doctrine of Perseverance of Saints being one of perseverance in holiness, and giving no encouragement to a confidence of final salvation which is not connected with a present and even an increasing holiness.

PER'SHORE, a market-town in the county of Worcester, and 9 miles south-east of the city of that name, on the Avon. It contains two churches—that of St Andrew's, small and ancient; and the church of the Holy Cross, in Norman and Early English, with a lofty square tower. This church is the only remaining portion of the ancient abbey-church of the same name. Pop. (1861) 2905, who are employed in wool-stapling, in manufacturing agricultural implements, and in raising fruits and vegetables for the markets of the large manufacturing towns in the vicinity.

PERSIA, called by the natives IRAN (see ARYAN RACE), the most extensive and powerful

productive powers of the country was much employed in ancient times; but the constant change of masters, and the never-ending disturbances under which P. has so long suffered, led to the neglect of the practice, and most of these specimens of the architectural skill and laborious industry of the ancient Persians, are now in a ruinous condition. The Caspian provinces abound in rivers, but the greater number of them, from the proximity of the Elburz Mountains to the Caspian, are mere mountain torrents, which become dry in summer.

Lakes.—P., as a natural consequence of the nature and situation of its surface, abounds with saline lakes, and there are nearly thirty of them having no visible outlets. The chief lake is Lake Urumiah (q. v.), in Azerbaijan. Lake Bakhtegan, in the east of Fars, the receptacle for the drainage of the northern half of that province, is about 60 English miles in length, by 9 in breadth. Lake Shiraz (q. v.) is much smaller.

Climate and Products.—The climate is necessarily very varied. What the Younger Cyrus is reported to have said to Xenophon regarding the climate, 'that people perish with cold at the one extremity, while they are suffocated with heat at the other,' is literally true. P. may be considered to possess three climates—that of the southern Dushtistan, of the elevated plateau, and of the Caspian provinces. In the Dushtistan, the autumnal heats are excessive, those of summer more tolerable, while in winter and spring the climate is delightful. The cold is never intense, and snow seldom falls on the southern slope of the Kerman range. The rains are not heavy, and occur in winter and spring. The district is extremely unhealthy. On the plateau, the climate of Fars is temperate, and as we proceed northwards, the climate improves, attaining its greatest perfection about Ispahan. Here the winters and summers are equally mild, and the regularity of the seasons appears remarkable to a stranger. To the north and north-west of this, the winters are severe; and in Kurdistan, the greater part of Azerbaijan, and the region of the Elburz, the climate is quite alpine. The desert region of the centre and east, and the country on its border, endure most oppressive heat during summer, and piercing cold in winter. The Caspian provinces, from their general depression below the sea-level, are exposed to a degree of heat in summer almost equal to that of the West Indies, and their winters are mild. Rains, however, are frequent and heavy, and many tracts of low country are marshy and extremely unhealthy. With the exception of the Caspian provinces, the atmosphere of P. is remarkable above that of all other countries for its dryness and purity, a fact frequently proved by exposing pieces of polished iron to the action of the air, and finding whether or not they rust.

The cultivated portions of P., when supplied with moisture, are very fertile, producing an immense variety of crops. The chief cultivated products are wheat (the best in the world), barley, and other cereals, cotton (of which, according to the statement of the Persian ambassador at London in 1861, enough could be grown in the southern provinces to supply the manufactories of Western Europe), sugar, rice, and tobacco. The vine flourishes in several provinces, and the wines of Shiraz are celebrated in Eastern poetry. Mulberries are also largely cultivated, and silk is one of the most important products of the kingdom. The forests on the slopes of the Elburz abound with wild animals, as wolves, tigers, jackals, boars, buffaloes, foxes, and the Caspian cat. Lions and leopards also abound in Mazanderan. Among domestic animals, the horse and camel hold the first place. The horses have always been celebrated as the finest

in the East. They are larger and more handsome, but less fleet than the Arabian horses. Immense herds of sheep and goats feed upon the mountain slopes of the southern provinces, and yield their owners a rich product in wool and goat-hair of the very finest quality. The wool of the goats is spun into various fabrics, which, in softness and beauty, almost vie with those of Cashmere. The Caspian rivers abound with fish, especially sturgeon, great quantities of which are cured and exported to Russia. The mineral products of P. are insignificant, with the sole exception of salt. None of the precious metals are found. Iron is abundant in Azerbaijan, but is little worked; copper occurs in considerable quantity in the mountains of Mazanderan and Kerman; and lead, antimony, sulphur, and naphtha also abound. But the most celebrated mineral product of P. is the turquoise, which is found in the Firouz Koh, one of the Elburz Mountains, and in a hill 40 miles west-north-west of Nishapur. The former mine is not now worked, but the mines in the latter place still yield these gems in abundance; and if they were properly worked, the yield might be greatly increased. The gems, however, are generally defaced by flaws, and do not possess a high mercantile value. Marble of different kinds, coal, freestone, and slate, are found in various places. At Dalki, in Fars, are two fountains of bitumen or black naphtha.

Inhabitants.—The population of P. is naturally divisible into two classes, the settled and the nomad. The settled population are chiefly Tajiks, the descendants of the ancient Persian race, with an intermixture of foreign blood—Turkish, Tartar, Arab, Armenian, or Georgian. To this class belong the agriculturists, merchants, artisans, &c. From having long been a subject race, they have to a large extent lost their natural independence and manliness of character, and acquired, instead, habits of dishonesty, servility, and cunning. The Tajiks are Mohammedans of the Shiite sect, with the exception of the few remaining Parsees or Guebres (q. v.), who are found in Kerman and Fars, and still retain their purity of race and religious faith. The nomad or pastoral tribes, or *eylats* (q. v.), are of four distinct races—Turkomans, Kurds, Lurs, and Arabs. Their organisation is very similar to that which formerly subsisted among the Highland clans of Scotland, with the exception that the former are nomad, while the latter inhabited a fixed locality. Each tribe is ruled by its hereditary chief (*ujak*), and under him by the heads of the cadet branches (*timars*) of his family. Of the four races, the Turkomans are by far the most numerous, and forms at the present day the ruling race in Persia. The Kurds are few in number, the greater part of their country and race being under the sway of Turkey. The Arabs are also few in number, and at the present day can hardly be distinguished from the Persians, having adopted both their manners and language. The Lurs are of nearly pure Persian blood. The nomad races, especially the Turkomans, profess the Sunnite creed; they are distinguished from the Tajiks by their courage, manliness, and independence of character; but they are inveterate robbers, and since their entrance into the country in the 10th c., it has been continually distracted by civil wars and revolutions. The whole population of P. is estimated at round numbers at 10,000,000, of whom 3,000,000 are nomads (200,000 of these being Arabs). Classified according to their religious belief, they stand thus: 7,500,000 are Shiites; 500,000 are Shiites not orthodox; 1,500,000 are Sunnites; while the remaining 500,000 is made up of Christians of all denominations (including 200,000 Armenians, 100,000 Nestorians), along with Jews, Guebres, &c.

civilisation into the country, and discipline into the army, the country was anew divided into 25 provinces—viz., the three Caspian provinces of Gililan, Mazanderan, and Astrabad, in the north; Azerbijan, Ardelan or Persian Kurdistan, Luristan, and Khuzistan, in the west; Fars, Laristan, and Kerman with Mogistan, in the south; while the great province of Irak-Ajemi in the centre was divided into Khamsah, Kasbin, Teheran, Hamadan, Kûm, and Ispahan; and that of Khorassan in the east into Yezd, Tabas, Ghayn and Birjun, Turshiz, Meshid, Damghan, Semnun, and the Dasht Beyad, or the Great Salt Desert. The western and northern provinces are well sprinkled with towns and large villages, but the most of the others consist of little more than the chief town and its suburbs, the rest being either desert, or in the hands of the wild pastoral tribes. There are many interesting ruins of ancient, populous, and celebrated cities in Persia, for example, Persepolis (q. v.), Rhages or Rhé, Shahpur, Istakhar, Tôs, Merv, Shushan, Hamadan, &c.; and the monuments and inscriptions found at some of these places form a highly-interesting study to the historian and the antiquary. See BEHISTUN. In modern times, Tabriz or Tauris, Kazbin, Ispahan, and Shiraz, have been in succession the seats of royalty, and at present Teheran is the favoured city.

Army.—The army consists (1860) of 80,000 regular infantry, 4000 regular cavalry, 2000 engineers and artillerymen, and a large body of irregular cavalry, which generally numbers about 30,000 men, and is contributed by the nomad tribes, being almost their sole acknowledgment of subjection to the Shah. This irregular cavalry, which forms the bravest portion of the Persian army, is equal to the Cossacks in the Russian army, and much superior to the Turkish Sultan's Bashibazouks. Abbas Pasha, the grandfather of the present Shah, attempted to organise a portion of the army according to European tactics, but he was unsuccessful.

History.—According to the *Shah Nameh* of Ferdusi (q. v.), the history of P. begins some thousands of years before the Christian era. Little has yet been done towards extracting the grains of historical truth that may be contained in the mass of fable that constitutes the native Persian annals; although hopes are cherished that by aid of the many inscriptions and monuments that are being daily discovered, light may yet be thrown upon many points. In the meantime, we must rest contented with the accounts derived from Greek writers. The north-western part of Iran, anciently called Media (q. v.), was, at the earliest period known to the Greeks, a part of the Assyrian empire, but the Medes revolted, and (708 B.C.), under Dejoces, established an empire which subdued both that of Assyria and their own kindred tribes of Persia. See MEDIA. About 537 B.C., the Persians under CYRUS (q. v.)—the Kai-Khuru of the Persians—(559—529 B.C.) rebelled, subdued their former masters, the Medes (who from this time became amalgamated with them), and established a mighty empire, which included, besides P., as far as the Oxus and Indus, Asia Minor, Syria, Palestine, and Mesopotamia. His son, CAMBYSES, a most ferocious and blood-thirsty tyrant (529—522 B.C.), subdued Tyre, Cyprus, and Egypt. After the brief rule of the usurper SMERDIS (522—521 B.C.), DARIUS I. (q. v.), surnamed HYSTASPES—the Gushtasp of the Persians—(521—485 B.C.), mounted the throne. He was a politic and energetic prince, and succeeded in firmly establishing his dynasty, and adding Thrace and Macedonia to his empire; but his two attempts to subdue Greece were completely foiled, the first by the Thracians, and the second by the Athenians at

Marathon (490 B.C.). His son, XERXES I. (485—465 B.C.)—the Isfunder of the Persians—renewed the attempt to subdue the Greek states, and though at first successful, the defeats of Salamis and Plataea compelled him to limit himself to a defensive warfare, which exhausted the resources of his kingdom. His son, ARTAXERXES I. (465—425 B.C.), surnamed LONGIMANUS (the Bahman of the Persians, better known as Ardeshir Dirazdust), was a valiant prince, but he was unable to stay the decadence of P., which had now commenced. He, however, crushed a formidable rebellion in Egypt, though his wars with the Greeks and Ionians were unsuccessful. The empire now became a prey to intestine dissensions, which continued during the reigns of his successors, Xerxes II., Sogdianus, Darius II., Artaxerxes II., and Artaxerxes III. DARIUS III. CODOMANUS (336—329) (the Darab II. of the Persians), the last of the dynasty, was compelled to yield his throne to Alexander (q. v.) the Great, king of Macedon (known as Secunder by the Persians), who reconquered all the former provinces of P., and founded a vast empire, which, at his death in 324 B.C., was divided into four parts, P. along with Syria falling to the share of the Seleucida (q. v.), and its old dependency, Egypt, to the Ptolemies (q. v.). The Seleucida soon lost Bactria (now Balkh), which became independent under a series of Greek sovereigns; and about 246 B.C. Parthia (q. v.)—now Northern Khorassan—also rebelled under ARSACES I. (the Ashk of the Persian writers), who founded the dynasty of the Arsacida, under whom the greater part of P. was wrested from the Greeks, and maintained against both the Greeks and Romans. The Greek empire of Bactria, which is said to have included a great part of Hindustan, was overthrown by an influx of nomad tribes from Turkestan, and these invaders having been driven out by the Parthians, Bactria was added to their empire. But the dynasty of the Arsacida was brought to an end by a Persian named Ardeshir Babegan, who managed to gain possession of Fars, Kerman, and nearly the whole of Irak, before Arduan, the Parthian king, took the field against him. At last, a great battle was fought (218 A.D.) on the plain of Hormuz, in which the Persians were completely victorious. Babegan was now hailed as Ardeshir, king of P., and 'Shahan Shah,' or king of kings. The history of this dynasty will be found under the head of SASSANIDÆ. The Sassanian kings raised P. to a height of power and prosperity such as it never before attained, and more than once perilled the existence of the Eastern Empire. The last king was driven from the throne by the Arabs (636 A.D.), who now began to extend their dominion in all directions; and from this period may be dated the gradual change of character in the native Persian race, for they have been from this time constantly subject to the domination of alien races. During the reigns of Omar (the first of the Arab rulers of P.), Othman, Ali, and the Ommiades (634—750), P. was regarded as an outlying province of the empire, and was ruled by deputy governors; but after the accession of the Abbaside dynasty (750 A.D.), Bagdad became the capital, and Khorassan the favourite province of the early and more energetic rulers of this race, and P. consequently came to be considered as the centre and nucleus of the califate. But the rule of the califs soon became merely nominal, and ambitious governors, or other aspiring individuals, established independent principalities in various parts of the country. Many of these dynasties were transitory, others lasted for centuries, and created extensive and powerful empires. The chief were the TURKISH

to be a Russian province. War with Russia was recommenced by P., at the instigation of France; and, after two years of conflicts disastrous to the Persians, the treaty of Gulistan (October 12, 1813) gave to Russia all the Persian possessions to the north of Armenia, and the right of navigation in the Caspian Sea. In 1826, a third war, equally unfortunate for P., was commenced with the same power, and cost P. the remainder of its possessions in Armenia, with Erivan, and a sum of 18,000,000 rubles for the expenses of the war. The severity exercised in procuring this sum by taxation, so exasperated the people, that they rose in insurrection (October 12, 1829), and murdered the Russian ambassador, his wife, and almost all who belonged to, or were connected with the Russian legation. The most humiliating concessions to Russia, and the punishment by mutilation of 1600 of the rioters, alone averted war. The death of the crown-prince, Abbas-Mirza (q. v.), in 1833, seemed to give the final blow to the declining fortunes of P., for he was the only man who seriously attempted to raise his country from the state of abasement into which it had fallen. By the assistance of Russia and Britain, Mohammed Shah (1834—1848), the son of Abbas-Mirza, obtained the crown, but the rebellions of his uncles, and the rivalry of Russia and Britain (the former being generally successful) at the Persian court, hastened the demoralisation of the country. Mohammed was compelled to grant (1848) to Russia the privilege of building ships of war at Reest and Astrabad, and to agree to surrender all Russian deserters, and P. became thus more and more dependent on its powerful neighbour. Nazir-uddin succeeded to the throne on his father's death in 1848; and the new government announced energetic reforms, reduction of imports, &c., but limited itself to these fine promises, and on the contrary, augmented the taxes, suffered the roads, bridges, and other public works to go to ruin, squandered the public money, and summarily disposed of all who protested against their acts. In October 1856, the Persians took Herat (q. v.), a town for the permanent possession of which they had striven for a long series of years; and having thus violated the terms of a treaty with Britain, war was declared against them, and a British army was landed on the coast of the Gulf, which, under Generals Outram and Havelock, repeatedly defeated the Persians, and compelled them to restore Herat (July 1857). Since this time, treaties of commerce have been concluded with the leading European powers; and Russia, Great Britain, Turkey, France, and Italy, have consuls in the chief towns, and, with the exception of Italy, are represented by ministers at the court of Teheran.

PERSIAN ARCHITECTURE. The architecture of Persia is of considerable interest, both on its own account, and as supplementary to and explanatory of that of Assyria, which, together with the similar edifices in Egypt, is the earliest architecture of which we have any knowledge. The buildings of Persia and Assyria closely resemble one another, and, owing to the mode and the materials in which they were constructed, their remains serve to illustrate and complete each other's history. In Assyria, where no solid building-materials exist, the walls are composed of masses of sun-dried brickwork, lined on the inside, to a certain height from the floor, with large sculptured slabs of alabaster. These have been preserved to us by the falling in of the heavy earthen roofs, with

which, as the later Persian buildings explain to us, the Assyrian palaces were covered. The explorations of Layard and Botta, and the specimens brought home by the former, and now in the British Museum, have made these sculptures familiar to us. The subjects usually are large bulls with human or lions' heads; priests with human bodies, and eagles' or lions' heads, performing religious service before the 'sacred tree.' The Assyrian remains are all of palace-temples, buildings somewhat resembling the Egyptian temples (which were also palaces); and many of the sculptures represent the exploits of the king in war and in peace. The palaces are always raised on lofty artificial mounds, and approached by magnificent flights of steps.

The buildings of Assyria extend over a very long period, the oldest at Nimroud being from 1300 to 800 B.C., and the more recent at Khorsabad and Koyunjik from 800 to 600 B.C. To these succeeded Babylon in the reign of Nebuchadnezzar, and the Birs Nimroud; but these are mere masses of decomposed brickwork, without any sculptures of harder material.

After Babylon came Pasargade—where the splendid palaces of Cyrus and Cambyses still exist in ruins—and Persepolis, the capital of Darius and Xerxes (560—523 B.C.), and some remains are still to be found at Susa, Ecbatana, and Teheran. At Persepolis, we find the very parts preserved which at Nimroud and Khorsabad are wanting; for here there is abundance of stone, and the pillars, walls, doorways, &c. (which, in the early examples, were no doubt of wood, and have decayed), being of stone, are still preserved. This has enabled Mr. Fergusson to 'restore' these buildings, and to produce most interesting designs, shewing not only how the palaces of Persia were constructed and lighted, but from them to suggest how the arrangements of all the ancient architecture of Egypt and Syria must have been designed.

The halls at Persepolis were square in plan, having an equal number of pillars in each direction for the support of the roof, which was flat. In the centre, a portion was left open for the admission of light, and sheltered by another roof raised upon pillars. The accompanying section (fig. 1) of the Great Hall of Xerxes (from Fergusson's *Handbook of*



Fig. 1.—Section of Hall of Xerxes at Persepolis.

Architecture) will explain this arrangement. This hall is the most splendid building whose remains exist in this part of the world. The remains of the 72 columns with which it was adorned are still extant (fig. 2). The hall had 36 columns, six on each side, and on three sides had an external portico, each with two rows of six columns. These columns had capitals, composed of bulls' heads and shoulders (fig. 3), between which the beams of the roof rested; while others were ornamented with scrolls like the Ionic order (fig. 4). The bases also are suggestive of the origin of that Greek style. This hall was 360

nearest to Zend and Sanscrit than to modern Persian. It has still the structure of an ancient organic Indo-Germanic language, with the distinct peculiarities of an Iranian tongue. (3) *Pehlevi* (q. v.) (West Iranian, Median, and Persian), in use during the period of the Sassanides (3d to 7th c. A. D.), an idiom largely mixed with Semitic words, and poorer in inflections and terminations than Zend. Its remnants consist of a certain number of books relating to the Zoroastrian religion, of coins and inscriptions; and the language is not quite the same in all cases—according to the larger or smaller infusion of foreign words. The non-Iranian element is known as *Huzvareh*, and is simply Chaldee; while the Iranian element is but little different from modern Persian. There are three distinct idioms to be distinguished in *Pehlevi*, and the writing varies accordingly, yet it is not certain whether the difference arises from their belonging to different districts or periods. When, however, *Pehlevi* ceased to be a living language, and the restoration of the pure Iranian had begun, people, not daring to change the writings, chiefly of a sacred nature, as they had descended to them from the Sassanian times, began to substitute, in reading, the Persian equivalents to the *Huzvareh* words. At last a new form of commentaries to the sacred writings sprang up, in which more distinct and clear Zend characters were used, where each sign has but one phonetical value, and where all the foreign *Huzvareh* words were replaced by pure Persian ones; and this new form was called (4) *Pāzand*. The transition from the ancient to the modern Persian is formed by the *Parsee*, or, as the Arabs call it, *Farsi*, in use from 700 to 1100 A. D., once the language purely of the south-western provinces, and distinguished chiefly by a peculiarity of style, rigid exclusion of Semitic words, and certain now obsolete forms and words retained in liturgic formulae. It is the Persian once written by the *Parsees* or fire-worshippers, and is in other respects very similar to the present or *modern Persian*, the language of *Jāmi*, *Nizāmi*, and *Hāfiz*—from 1100 to the present time—with its numerous dialects. The purest dialect is said to be that spoken in Shiraz and Isfahan and their neighbourhood. In general, the language is pronounced by universal consent to be the richest and most elegant of those spoken in modern Asia. It is the most sonorous and muscular, while at the same time it is the most elegant and most flexible of idioms; and it is not to be wondered at, that, throughout the Moslem and Hindu realm, it should have become the court language, and that of the educated world in general; holding a position somewhat similar to that which the French language held up to within a recent period in Europe. Its chief characteristic, however, is the enormous intermixture of Arabic words, which, indeed, almost make up half its vocabulary. Respecting its analytical and grammatical structure, it exhibits traces only of that of the ancient dialects of Zend and Achæmenian, of which it is a direct descendant. The elaborate system of forms and inflections characteristic of those dialects has been utterly abandoned for combinations of auxiliary words, which form independent connective links, and which impart fulness and an incredible ease to speech and composition, but which, at the same time, correspond as little to the classical notion of inflection. The grammar of the Persian language has been called 'regular'; but the fact is, that there is hardly any grammar worth mentioning—at all events, no grammar the rules of which could not be mastered in the briefest possible period. To begin with: there is no gender

distinguished in declension; the plural is always formed in the same manner, the only distinction consists in animate beings receiving the affix *ān*, while the inanimate are terminated in *kā*; further, that instead of the inflection in the different cases found in the ancient languages, either a *mar* (hitherto unexplained) is prefixed, or a *rd* (*rdh* = way, by reason of, *Pehlevi*, *Parai*) is affixed. Between the genitive and the word which governs it, also between a noun and its following adjective, an *i* is inserted. This is the whole declension, not only of the noun, but also of the adjective and pronoun. The comparative is formed, as in the mother-tongues, by the addition of *ter*; the superlative adds *terin*, which is New-Persian exclusively. Not even the pronouns have a gender of their own; the distinction between masculine and feminine must be expressed by a special word, denoting male or female. There is no article, either definite or indefinite. Singularity of a noun is expressed by an appended *ē*, a remnant of *ēva*, one. The flexion of the verb is equally simple. There is a set of personal terminations for all tenses:—*am*, *i*, *ad* or *ast*; *ēm*, *ēd*, *nd*; the infinitive ends in *tan* or *dan*, the past participle in *tah* or *dih*. The aorist is formed by adding to the root the terminations *am*, *i*, *ad*; *ēm*, *ēd*, *and*; the preterite by dropping the *a* of the infinitive, and substituting the usual terminations. The prefix *mi* or *hami* (*Parai* and *Huzvareh* = always) transforms the preterite into the imperative; while the prefix *bi* or *bih* (the present of the verb 'to will') alters the aorist into the simple future. The other tenses are compounds of the past participle and auxiliary verbs, as in the Teutonic and other modern tongues. The passive is formed by the various tenses of the verb *shudan*, 'to be, to go, to beware,' being placed after the past participle. As to syntax, there is none, or, at all events, none which would not come almost instinctively to any student acquainted with the general laws of speech and composition. As the time of its greatest brilliancy may be designated that in which Firdusi wrote, when Arabic words had not swamped it to the vast degree in which it is now found, and were still, as far as they had crept in, amenable to whatever rules the Persian grammar imposed upon the words of its own language.

In the history of the Persian writing, three epochs are to be distinguished. First, we have the Cuneiform (q. v.), by the side of which there seems, however, to have been in use a kind of Semitic alphabet for common purposes. This, in the second period, appears to have split into several alphabets, all related to each other, and pointing to a common Syriac origin (such as the different kinds of *Pehlevi* characters and the Zend alphabet) cleverly adapted to the use of a non-Semitic language. In the third period, we find the Arabic alphabet enlarged for Persian use by an addition of diacritical points and signs for such sounds as are not to be found in Arabic (*p*, *ch*, *zh*, *g*). The characters are written in a somewhat more pending manner (*Talik*) in Persian, and the writing is thus slightly different from the usual Arabic *Neskh*.

The much-spoken-of close connection between German and Persian—both of Indo-Germanic kin—is neither more nor less than a popular fallacy, caused by a misunderstood dictum of Leibnitz: 'Integri versus Persice scribi possunt quos Germanus intelligat,' which was enthusiastically taken up and 'proved' by Adelung, Hammer-Purgstall, and others, and which has even led to the assumption, that the Germans came direct from Persia, or that the Goths once were mixed with the Persians. We only mention it as a philological absurdity of bygone days.

Of the Literature of the Persians before the

Fables; *Anvari Suheili*, by Husein Vais Kashifi; the *Tutinameh*, or Book of Parrots, a collection of fairy tales, by Nechshebi; the *Behari-Danish*, by Inajeth Allah, &c.—form a fit transition from poetry to prose, for little more is to be said of Persian poetry after the 15th century. Modern imitations of ancient classical works, such as the New Book of Kings, the *Shahinshah-Nameh*, which treats of modern Persian history; the *George Nameh*, which sings the English conquests in India, &c., are hardly worth pointing out in so brief a summary as ours. Of native writers on the poets, are to be named Dewlet Shah (who describes the poets from the 10th to the 15th centuries), Sam Mirsa (the poets of the 16th), and Luft Ali Beg (the poets of modern time). In prose, it is chiefly history which deserves our attention. Able rivals of the great Arabic historiographers sprang up at an early period. For the mythical times, or those of which no knowledge, save through a medium of half-legend, has reached later generations, Firdusi's gigantic epos remains the only source. But after the chroniclers we find Fadhl Allah Reshid Eddin, the vizier of Ghazan, born 1247 at Hamadan, who was executed in 1320. He wrote the *Collector of Histories*, in three volumes, to which he afterwards added a fourth geographical volume: a summary of the history of all Mohammedan countries and times, containing besides a complete history of sects. Worthy and contemporaneous rivals are Fachr Eddin Mohammed Bina Kiti, author of a universal history; and Khodja Abdallah Wassaf, the panegyrist, the model of grand and rhetorical style. His most successful imitator in the 14th c. is Abdel Reesak; and in the 15th, Sheref Eddin Ali Yezdi, who wrote the history of Timur. Up to that period, pomposity of diction was considered the principal beauty, if not the chief merit, of a classical Persian history. From the 15th c. downwards, a healthy reaction set in, and simplicity and the striving after the real representation of facts, became the predominant fashion. As the *facile princeps* among these modern historians is to be mentioned Mirkhond, whose Universal History (*Ranset Essafa*) comprises the period from creation to the reign of Sultan Hasan Beikara, in seven books. After him are to be mentioned his son Khondemir, Gaffari, Moslih Eddin Mohammed Lari, and Abu Tahir of Tortosa in Spain, who wrote the *Derab Nameh*, a biographical work on the Persian and Macedonian kings, and the ancient Greek physicians and philosophers.

Among Indian historians—and they form a most important class—who wrote in Persian, we have Mohammed Kasim Ferishtah (1640), who wrote the ancient history of India up to the European conquest; Mohammed Hashim, Abul Fadel Mobarrek (*Akbar Nameh*); further, Abdel Reesak (*History of the Padishahs*), Mirza Mehdi, Gholam Hussein Khan, and others. One of the most recent works of this description is the *Measiri Sultaniye*, which contains the history of the present dynasty of Persia, and which was published in Teheran, 1825, and translated by Bridges (Lond. 1833).

Biographies, legends, histories of martyrs, and the like are legion. Most of the biographies of the Prophet, however, are taken from the Arabic.

Little is to be said of Persian productions on special branches of exact science. There are a few works on geography—more generally treated together with history—such as those of Mestafi, Ahmin Ahmed Rasi, Berdshendi, &c. In theology, little beyond translations of the Koran, and a few commentaries on single chapters, and of some portions of the Traditions (*Sunnah*), has been produced—the Arabic works being completely sufficient, in religious matters, for all Mohammedans.

For the history of early Persian religion are of importance the *Ulemai Islam* and the *Dabistan*, a description of all the creeds of the East. Jurisprudence has likewise to shew little that is original, and not mere translation, partial commentary, or adaptation in Persian. The *Hedadshah*, the *Inadshah*, the *Futawa Alemgiri*, are the most important legal works to be mentioned here. A great deal has been done in the field of medicine, surgery, pharmacy, physical sciences, by Persians; but nearly all their chief works being written in Arabic, they do not concern us here. Mathematics, astronomy, and philosophy, have received due attention; rhetoric, the art of letter-writing, metrical and poetical arts, have likewise been cultivated with great assiduity, but few standard works are to be enumerated. Grammar and lexicography found their principal devotees in India; and of dictionaries, the *Ferhengi-Shiuri*, *Burhani Katiu*, and principally the *Heft Kulzum* (the Seven Seas), by the Sultan of Oude, deserve attention. Translations from Greek, Indian, Arabic, Turkish, and other works into Persian, exist in great abundance, and some of them have paved the way to the knowledge of the original sources in Europe.—Chief authorities and writers on the subject of Persian Language and Literature, are Meninsky, Richardson, Lumsden, Forbes, Ibrahim De Lacy, Hammer-Purgstall, Briggs, Jones, Duperron, Stewart, Quatremere, Wilken, Defremery, Vullers, Iken, Kosegarten, Onseley, Chodzko, Bland, Sprenger, Graff, Brockhaus, Dorn.

PERSIAN POWDER, a preparation of the flowers of the composite plant, *Pyrethrum caruenum* or *roseum*, which are dried and pulverised. This powder has wonderful efficacy in destroying noxious insects, and is extensively used for that purpose in Russia, Persia, and Turkey. It has lately been introduced into France and Britain, and promises to be of great use, not only in ridding houses of their insect pests, but in aiding the horticulturist in protecting his plants. The plant is a native of the Caucasus, where the flowers are gathered wild, and sent to be manufactured chiefly at Teflis. It might readily be cultivated in this country, where its value for destroying moths alone would render it a profitable crop. Its habit is very similar to that of camomile.

PERSIGNY, JEAN GILBERT VICTOR, COMTE DE, whose proper name is FIALIN, a noted adherent of the Emperor Napoleon III., was born at Saint-Germain-Lespinasse, in the department of Loire, 11th January 1808, entered the *École de Cavalerie* at Saumur in 1826, and obtained an appointment to the 4th regiment of hussars in 1828. At this period, Fialin was royalist in his politics; but he soon changed to a liberal, and took an active part in the July revolution. Insubordination, however, led to his final expulsion from the army in 1833. After a brief trial of Saint-Simonianism, Fialin was converted to the Bonapartist cause, dropped the name of Fialin, and took up that of P. (from an 'hereditary estate'), with the title of Vicomte. Introduced to Louis Napoleon by the ex-king Joseph, he at once formed the most intimate relations with the Prince, and commenced a career of Bonapartist propaganda throughout France and Germany, in which he displayed extraordinary energy, pertinacity, and fertility of resource. He had the chief hand in the affair of Strasburg, and subsequently apologised for its humiliating failure in a pamphlet entitled *Relation de l'Entrepriee du Prince Napoleon Louis* (Lond. 1837), in which he throws the blame of the disaster on 'Fate.' He also took part in the descent on Boulogne, where, like his master, he had the misfortune to be captured, and was condemned to twenty years'

Charity, are often personified in the gravest and most argumentative compositions.

PERSONNEL, in speaking of an army, represents the officers and soldiers, as opposed to the *matériel*, in which are comprised the guns, provisions, wagons, and stores of every description.

PERSPECTIVE (Lat. *perespicio*, I look through), is the art of representing natural objects upon a plane surface in such a manner that the representation shall affect the eye in the same way as the objects themselves. The distance and position of objects affect both their distinctness and apparent form, giving rise to a subdivision of perspective into *linear perspective*, which, as its name denotes, considers exclusively the effect produced by the position and distance of the observer upon the apparent form and grouping of objects; while *aërial perspective* confines itself to their distinctness, as modified by distance and light. The necessity of attending to the principles of perspective in all pictorial drawing is apparent when we consider, for instance, that a circle, when seen obliquely, appears to be not a circle, but an ellipse, with its shortest diameter in line with the spectator, and its longest at right angles to this. A square, when looked at from a position opposite the centre

taken, from an eminence; but when the station is on a level, either actual or assumed, as is the case when a statue or a mountainous landscape is figured, the horizontal line must be low. The horizontal line in nearly all cases is supposed to be level with the spectator's eye. 3. The *vertical line*, which is drawn from the supposed position of the sketcher, perpendicular to the ground and horizontal lines, meeting the latter in a point which is called the *point of sight*, or centre of the picture. The vertical line has no representative in nature, and is merely a mechanical adjunct to the construction of the picture, all vertical lines in nature being parallel to it in the picture. The point of sight being the point directly opposite to the observer, is properly placed in the centre of the picture, for it is most natural that the view should lie symmetrically on each side of the principal visual line; but this is not by any means a universal rule, for we very frequently find it on the right or left side, but always, of course, on the horizontal line. All lines which in nature are perpendicular to the ground line, or to a vertical plane which is raised upon it as a base, meet in the point of sight, which is thus their *vanishing point* (see the line of the tops and bottoms of the pillars in fig. 1). The *points of distance* are two points in the

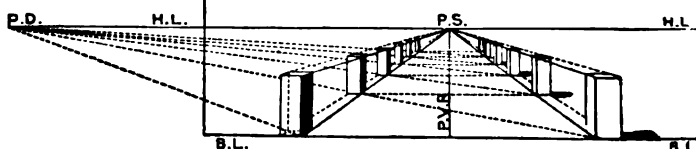


Fig. 1. Illustrating the more important points and lines; P.V.R. is the principal visual ray.

of one of its sides, appears as a trapezoid, the sides which are perpendicular to the direction of vision appearing to be parallel, while the other two appear to converge to a point in front of the spectator, &c. For the same reason, two rows of parallel pillars of equal height, seen from a point between and equidistant from each row, appear not only to converge at the further end, but to become gradually smaller and smaller. An excellent idea of a perspective plan can be easily obtained by interposing a vertical transparent plane (as of glass—a window, for instance) between the observer and the objects of his vision, and supposing that the objects he sees are not seen through the glass, but painted on it. A sketch made on a glass plane in this position by following with a pencil all the lines and shades of the objects seen through it, the eye being all the time kept quite steady, would form a picture in perfect perspective. In practice, however, it is found, unfortunately, that glass is not a suitable material for sketching on, and that the vertical position is not the most convenient; it is therefore preferable to make a careful study of the effects produced by change of position and distance on the appearance of objects in nature, and from the results of this to compile a body of rules, by the observance of which painters may be enabled to produce an effect true to nature. After the 'scope' (i. e., the number of objects to be introduced, and the distance at which they are to be viewed) of the picture has been determined, and before the design is commenced, it is necessary to draw upon the perspective plan three lines: 1. The *base line*, or *ground line*, which limits the sketch towards the operator, and is the base line of the picture. 2. The *horizontal line*, which represents the ordinary position of the sensible horizon. The height of the horizontal line is about one-third of the height of the picture, when the sketcher is placed at or little above the level of the horizon; but it may rise in a degree corresponding to his increase of elevation till it reaches near to the top of the perspective plan. The general rule is to have a high horizontal line when the view is taken, or supposed to be

horizontal line on each side of the point of sight, and in a 'direct' sketch are at a distance from it equal to the horizontal distance of the sketcher's eye from the ground line. The equality of distance of these points from the point of sight is not, however, necessary, as it occurs only in those cases where the lines, of which the points of distance are the *vanishing points*, are inclined (in nature) at an angle of 45° to the base line; but, in all cases, the two points of distance are about twice as far apart as the eye is from the picture. One important use of the points of distance is to define the distance of objects in a row (fig. 1) from each other. For this purpose, two points of distance are not necessary, as, when the position of one pillar is found, that of the one opposite is at once obtained by drawing a line parallel to the base or ground line. We have seen that the point of sight is the *vanishing point* of all level lines which meet the ground line or a vertical plane on it at right angles, and that the points of distance (in a *direct* picture) are the *vanishing points* of all lines which cut the ground line at an angle of 45°; but there are many other groups of parallel lines in a picture which have different situations, and therefore different *vanishing points*. Such lines with their *vanishing points* (called, for distinction's sake, *accidental points*) are represented in fig. 2. If the accidental point is above the horizontal line, it is called the *accidental point aërial*—if below, the *accidental point terrestrial*; and a little consideration makes it evident that these points may or may not be situated within the plane of the picture. Such are the points and lines necessary for the construction of a plan in true perspective; and from the above explanation, we may deduce the two general principles: 1. That all parallel straight lines in nature are no longer parallel when projected on the

Perth, by command of James VI., on 25th August 1618. These Articles enjoined kneeling at the Lord's Supper, the observance of Christmas, Good Friday, Easter, and Pentecost, and confirmation, and sanctioned the private administration of baptism and of the Lord's Supper. They were highly obnoxious to the Presbyterians of Scotland, not only on their own account, but as part of an attempt to change the whole constitution of the church; and because they were adopted without free discussion in the Assembly, and in mere compliance with the will of the king, who was also regarded as having unduly interfered with the constitution of the Assembly itself. They were, however, ratified by the parliament on 4th August 1621—a day long remembered in Scotland as *Black Saturday*—were enforced by the Court of High Commission, and became one of the chief subjects of that contention between the king and the people, which produced results so grave and sad for both, in the subsequent reign. The General Assembly of Glasgow, in 1638, declared that of Perth to have been 'unfree, unlawful, and null,' and condemned the Five Articles.

PERTHES, FRIEDRICH CHRISTOPH, an eminent German publisher, distinguished not only in his professional capacity, but for his sincere piety and ardent patriotism, was born at Rudolstadt, 21st April 1772. In his 15th year, he was apprenticed to a Leipzig bookseller, with whom he remained six years, devoting much of his leisure time to the acquisition of knowledge. In 1793, he passed into the establishment of Hoffmann, the Hamburg bookseller; and in 1796, started business on his own account; and, by his keen and wide appreciation of the public wants, his untiring diligence, and his honourable reputation, he ultimately made it the most extensive of the kind in modern Germany. During the first few years or so of his Hamburg apprenticeship, his more intimate friends had been either Kantian or sceptical in their opinions, and P., who was not distinguished for either learning or speculative talent, had learned to think with his friends; but a friendship which he subsequently formed with Jacobi (q.v.), and the Holstein poet and humorist, Matthias Claudius, led him into a serious but liberal Christianity. The iron rule of the French in Northern Germany, and the prohibition of intercourse with England, nearly ruined trade, yet P., even in this great crisis of affairs, found ways and means to extend his. He endeavoured to enlist the intellect of Germany on the side of patriotism, and in 1810 started the *National Museum*, with contributions from Jean Paul Richter, Count Stolberg, Claudius, Fouqué, Heeren, Sartorius, Schlegel, Görres, Arndt, and other eminent men. Its success was far beyond P.'s expectations, and encouraged him to continue his patriotic activity, till Hamburg was formally incorporated with the French empire. He subsequently took a prominent part in forcing the French garrison to evacuate Hamburg, 12th March 1813; and on its re-occupation by the French, he was one of the *ten* Hamburgers who were specially excepted from pardon. After peace had been restored to Europe, P. steadily devoted himself to the extension of his business, and to the consolidation of the sentiment of German national unity, as far as that could be accomplished by literature and speech. In 1822, he removed to Gotha, transferring his Hamburg business to his partner Besser. Here he laid himself out mainly for the publication of great historical and theological works. His subsequent correspondence with literary, political, and theological notabilities—such as Niebühr (one of his dearest friends), Neander, Schleiermacher, Lücke, Nitzsch, Tholuck, Schelling, and Umbreit—

is extremely interesting, and throws a rich light upon the recent inner life of Germany. He died 18th May 1843.—See *Friedrich Perthes' Leben* (12th edit. 1853), written by his second son, Clemens Theodor Perthes, Professor of Law at Bonn.—The uncle of Friedrich Christoph P. was JOHANN GEORG JUSTUS PERTHES, who established a publishing and bookselling house at Gotha in 1785, which has acquired, in the hands of his sons, a great reputation, and from which issues the famous *Almana de Gotha*.

PERTSHIRE, one of the most important counties in Scotland, is bounded on the S. by the shires of Stirling and Clackmannan; on the N. by Inverness and Aberdeen; on the W. by Argyll and Dumbarton; and on the E. by Forfar, Fife, and Kinross. It extends from east to west about 70 miles, and from north to south about 65 miles. Its area is 2834 miles, or 1,814,063 acres, of which above 32,000 are covered with water. It is divided into the Highland and Lowland districts, the former occupying much the larger surface, and these are subdivided into 10 divisions—viz. Menteith, Strathearn, Gowrie, Stormont, Strathardle, Glenshee, Athole, Breadalbane, Rannoch, and Balquidder. P., from its insular position and other advantages, has a comparatively mild climate; and the soil, in Strathearn, Carse of Gowrie, and other less extensive tracts, being mostly composed of a rich loam, crops of all kinds are brought to the utmost perfection. These districts are also famed for their fruit and floral productions. P. is not less distinguished for its magnificent mountain, lake, and river scenery. The Grampians here attain to nearly their maximum height, Ben Lawers being within a few feet of 4000 in altitude; while Ben More is 3818; and several others above 3000. The lakes are numerous, the principal of which are Lochs Tay, Erchie, Rannoch, Tummel, Lydos, Garry, Lyon, and Dochart. There are several streams of note, the principal being the Tay, which is fed by numerous other streams, and is said to discharge as much water into the sea as any other river in the kingdom. These lakes and streams afford excellent fishing, and the Tay is valuable for its salmon, yielding in rent about £12,000 a year.

According to the last agricultural statistics, taken in 1857, the number of occupants was 3616, and the acreage under rotation of grass and hay was 99,656, and under crops 267,397; of which there were in wheat, 25,638 acres, averaging 25 bushels $3\frac{1}{4}$ pecks per acre; in barley, 18,802 acres, averaging 31 bushels $\frac{1}{2}$ peck per acre; in oats, 64,044 acres, averaging 35 bushels $\frac{1}{2}$ peck per acre; in bere, 655 acres, averaging 30 bushels $3\frac{1}{2}$ pecks per acre; in beans and peas, 4250 acres, averaging 21 bushels $3\frac{1}{4}$ pecks per acre; in turnips, 33,513 acres, averaging 13 tons per acre; in potatoes, 17,482 acres, averaging 2 tons $11\frac{1}{2}$ cwt. per acre. Of live stock there were—horses, 15,953; cattle, 80,716; sheep, 544,742; swine, 9369.—Total stock, 650,780.

The above statistics shew that there are more occupants or tenants in this county than in any other in Scotland with the exception of Aberdeen, where there are more than double the number: that the acreage under crop is also greater, with the above exception; while the average produce of wheat, barley, and turnips is less than in 24 out of the 32 counties. Of oats the average is less than in 14 counties, and of potatoes less than in 22. The live stock exceeds in value any other county, Aberdeen excepted, and outnumbers all except Argyll, which possesses 827,000 sheep. The old valued rental was £28,330; the new valuation for 1862–1863 was £732,766, exclusive of railways. The rate of

changes, let us roughly consider one or two simple cases. First, to find the nature of some of the effects of a disturbing force acting in the radius-vector, and tending to draw the disturbed, from the central body. Let S be the focus, P the nearer apse, of the undisturbed elliptic orbit. When the moving body passes the point M , the tendency of the disturbing force is to make it describe the dotted curve in the figure—i. e., the new direction

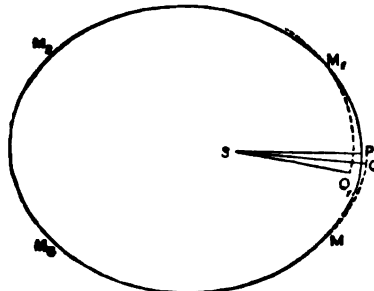


Fig. 1.

of motion will make with the line MS an angle more nearly equal to a right angle than before; and therefore the apse Q in the disturbed orbit will be sooner arrived at than P would have been in the undisturbed orbit—that is, the apse *regre-des*, or revolves in the contrary sense to that of M 's motion. Similarly, the effect at M_1 is also to make the apse regre-de to Q_1 . At M_2 and M_3 , on the other hand, the tendency is to make the apse progrede. Also, as the velocity is scarcely altered by such a force, the major axis remains unaltered. Thus at M the eccentricity is diminished, and at M_1 increased, since the apsidal distance is increased at M , and diminished at M_1 .

Next, consider a tangential accelerating force. Here the immediate effect is to increase the velocity at any point of the orbit, and therefore to make it correspond to a larger orbit, and, consequently, a longer periodic time. Conversely, a retarding force, such as the resistance of a medium, diminishes the velocity at each point, and thus makes the motion correspond to that in an ellipse with a less major axis, and therefore with a diminished periodic time. This singular result, that the periodic time of a body is *diminished* by resistance, is realised in the case of Encke's comet, and this observed effect furnishes one of the most convincing proofs of the existence of a resisting medium in interplanetary space.

Again, the effect of a disturbing force continually directed towards the plane of the ecliptic, is to make the node regre-de. Thus, if N, N' represent

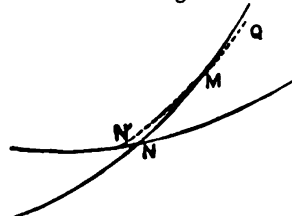


Fig. 2.

the ecliptic, NM a portion of the orbit, the tendency of the disturbing force at M is to make MQ the new orbit, and therefore N' the node. Thus the node regre-des, and the inclination of the orbit

the node regre-des, but the inclination is increased. If NN' and N_1N_1' in these figures represent the earth's equator, the above rough sketch applies exactly to the case of the moon as disturbed by the oblateness of the earth. The reaction of the moon on the earth gives rise to the Precession of the Equinoxes.

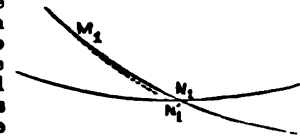


Fig. 3.

By processes of this nature, Newton subjected the variation of the elements of the moon's orbit to calculation, and obtained the complete expression of some of the most important of the lunar inequalities. See MOON. Others of them—for instance, the rate of progression of the apse—cannot be deduced with any accuracy by these rough approximations, but tax, in some cases, the utmost resources of analysis. Newton's calculation of the rate of the moon's apse was only about half the observed value; and Clairaut was on the point of publishing a pamphlet, in which a new form was suggested for the law of gravitation, in order to account for the deficiency of this estimate; when he found, in carrying his analysis further, that the expression sought is obtainable in the form of a slowly converging series, of which the second term is as large as the first. The error of the *Nautical Almanac*, founded almost entirely on Laplace's calculations, with the necessary introduction of a few data from observation, rarely amounts to a second of time in the moon's place is predicted four years hence in the *Nautical Almanac*, with a degree of precision which no mere observer could attain even one day to the next. This is the true power of the law of gravitation, but of the Law of Motion (*q. v.*), upon which, of course, the analysis is based.

With respect to the mutual perturbations of the planets, we may merely mention that they are divisible into two classes, called *periodic* and *secular*. The former depend upon the configuration of the system—such, for instance, is the diminution of the inclination of the moon's orbit, after passing the ascending node on the earth's equator, and mentioned, or its increase as the moon comes to the descending node. The secular perturbations, upon the period in which a complete series of alternations have been gone through, and in the case of the planets, complete cycles may be traced by hundreds of years.

A very curious kind of perturbation is seen in the *indirect* action of the planets on the earth's orbit, due to planetary action, which brings the sun, on the average, nearer to the earth and moon for a long period of years, the equal period takes it further off. One of the effects of the sun's disturbing force being, as we have seen, to diminish, on the whole, the moon's distance towards the earth, this diminution will vary in the same period as the eccentricity of the earth's orbit; and therefore the moon's mean motion will be alternately accelerated and retarded, each period occupying an immense period.

With special reference to the planetary motions, we may notice that the major axis of each planet's orbit is free from all secular variations; and that the inclination and eccentricity are confined within small limits, and ultimately come to rest themselves. These facts, which have been and beautifully demonstrated by Laplace and Lagrange, assure the stability of the planetary orbits, if we neglect the effects of resistance due to

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the interplanetary matter; which, however, must, in the long run, bring all the bodies of the system into collision with the sun, and finally stop the rotation of the sun itself.

Newton commenced the investigation of perturbations by considering those of the moon; Euler followed with a calculation of Saturn's inequalities; while Clairaut, D'Alembert, and others successively gave those of the other planets.

Every one knows that it was by observing the perturbations of Uranus, and thence discovering the direction of the disturbing force, that Adams and Leverrier were led to their great and simultaneous discovery of the planet Neptune.

PERU', an important maritime republic of South America, bounded on the N. by Ecuador, on the W. by the Pacific, on the S. and S.E. by Bolivia, and on the E. by Brazil. It lies in lat. $3^{\circ} 25' - 21^{\circ} 30' S.$, and in long. $68^{\circ} - 81^{\circ} 20' W.$ The general outline resembles a triangle, the base of which is formed by the boundary-line between P. and Ecuador on the north. Its area is estimated at upwards of 500,000 square miles; and its population at 2,200,000. The area of P., however, can only be given approximately, as, on the east side of the Andes, and between the Amazon and the Purus, there is a wide and unexplored expanse of country, upon which both P. and Brazil have claims, which have not yet been determined. The country is 1100 miles in length, 780 miles in extreme breadth along the northern boundary, but is little more than 50 miles wide in the extreme south. Following the general direction, and not including windings, the coast-line is 1660 miles in length. The shores are in general rocky and steep; in the south, lofty cliffs rise from the sea, and, in some places, the water close inshore has a depth of from 70 to 80 fathoms. Further north, however, sandy beaches occur, and in the extreme north, the shores are often low and sandy, and covered with brushwood. Owing to the comparative unfrequency of bays and inlets along the coast, the harbours are few and unimportant. Those of Callao (the port of Lima) and Payta afford the most secure anchorage, and the others are Trujillo, Cañete, Pisco, Camaná, Islay, Ilo, Arica, and Iniquique. Landing by boats is always dangerous, on account of the dreaded surf, occasioned by the swell of the Pacific, which perpetually beats upon the coast; and when goods or passengers require to be landed on unsheltered shores, recourse is had to the primitive *balsas*, or rafts, worked by the natives, and capable of carrying two or three persons.

Islands.—The islands on the Peruvian coast, although valuable, are extremely few in number, and small in extent. In the north, are the Lobos (i. e., *Seals*) Islands, forming a group of three, and so called from the seals which frequent them. The largest of them, Lobos de Tierra, is 5 miles long by 2 miles broad, and the others, lying 30 miles south-west, are much smaller. On their eastern and more sheltered sides, they are covered with guano, and the quantity on the whole group is stated at 4,000,000 tons. The Chincha Islands, famous as the source from which Europe has been supplied with Peruvian guano (see GUANO) since 1841, also form a group of three, and are situated in the Bay of Pisco, about 12 miles from the mainland, and in lat. $13^{\circ} - 14^{\circ} S.$, long. $76^{\circ} - 77^{\circ} W.$ They lie in a line running north and south, and are called the North, Middle, and South Islands respectively. They closely resemble each other in size, formation, and general character. Each island presents, on the eastern side, a wall of precipitous rock, with rocky pinnacles in the centre, and with a general slope towards the western shore. The cavities and

inequalities of the surface are filled with guano, and this material covers the western slopes of the islands to within a few feet of the water's edge. There is no vegetation. The North Island has an area of 20½ acres. It is formed of felspar and quartz, and is slowly but certainly decreasing in size. This island is wholly covered with thick layers of guano, which is quarried in some places to a depth of 80 feet. Two hundred convicts are employed here in cutting the guano and loading the vessels. The Middle Island, on which there are 140 acres occupied by guano, has been worked to some extent, and in this case the labourers are Chinese. It was estimated that in 1861, there were still lying on the islands about 9,538,735 tons of guano, which, at the present rate of consumption, will last until the year 1883. The island of San Lorenzo forms the harbour of Callao.

The grand physical feature of the country, and the source of all its mineral wealth, is the great mountain system of the Andes. A general description of the formation and character of the Peruvian Andes is given under the article ANDES (q. v.).

Surface, Soil, and Climate.—The surface of P. is divided into three distinct and well-defined tracts or belts, the climates of which are of every variety from torrid heat to arctic cold, and the productions of which range from the stunted herbage of the high mountain-slopes, to the oranges and citrons, the sugar-canes and cottons, of the luxuriant tropical valleys. These three regions are the *Coast*, the *Sierra*, and the *Montaña*.—The *Coast* is a narrow strip of sandy desert between the base of the Western Cordillera and the sea, and extending along the whole length of the country. This tract, varying in breadth from 30 to 60 miles, slopes to the shore with an uneven surface, marked by arid ridges from the Cordillera, and with a rapid descent. It is for the most part a barren waste of sand, traversed, however, by numerous valleys of astonishing fertility, most of which are watered by streams, that have their sources high on the slopes of the Cordillera. Many of the streams are dry during the greater part of the year. Between these valleys extend deserts, which are sometimes 90 miles in width. These are perfectly trackless, being covered with a fine, shifting, yellow sand, which is often carried about by the wind in pillars of from 80 to 100 feet in height. In the coast-region, properly so called, rain is unknown. This is caused by the coast of P. being within the region of perpetual south-east trade-winds. These winds, charged with vapours from the Atlantic, strike upon the east coast of South America, and traverse that continent obliquely, distributing rains over Brazil. But their vapour is thoroughly condensed by the lofty Cordilleras, and their last particles of moisture are exhausted in powdering the summits of these ranges with snow, after which they fall down upon the coast of P., cool and dry. The want of rain, however, is compensated for to some extent by abundant and refreshing dews, which fall during the night. The climate of the coast is modified by the cool winds. In the valleys, the heat, though considerable, is not oppressive. The highest temperature observed at Lima in summer is 85° , the lowest in winter is $61^{\circ} F.$

The *Sierra* embraces all the mountainous region between the western base of the maritime Cordillera and the eastern base of the Andes, or the Eastern Cordillera. These ranges are, in this country, about 100 miles apart on an average, and have been estimated to cover an area of 200,000 square miles. Transverse branches connect the one range with the other, and high plateaux, fertile plains, and deep tropical valleys lie between the lofty outer barriers.

The superiority in elevation alternates between the two principal ranges. The east range, or, as it is generally called, the Andes, has the superiority in height in the southern half of this mountain system. It abuts upon the plain, from the Bolivian frontier, in a majestic mass, surmounted by stupendous pinnacles, rugged in outline, and most frequently rising in splintered needle-like peaks, covered with snow. North of lat. 13° S., however, the Western Cordillera assumes the grander character, and preserves it until it crosses the northern frontier. The scenery of the Western Cordillera is broader and more massive in character, and its summits less pointed than those of the Andes. Rugged paths, sometimes so narrow as barely to afford footing to the mules which are invariably used in such ascents, lead up its steep sides. Occasionally, from these narrow passes, gaping and apparently bottomless precipices slide perpendicularly downward from the very feet of the traveller, and the prospect is rendered still more hideous by the distant roar of a torrent, hidden by mists, at the bottom of the ravine. Occasionally, also, the mountain route leads over abysses 500 feet in depth, across which, by way of bridge, a few poles are thrown, which roll about in an uncomfortable manner under the feet. In traversing these dangerous passes, which line the huge rocks like aerial threads, the traveller often comes upon scenery of the most picturesque and beautiful description. The clefts and sides of the hills, even at altitudes which might be called alpine, are clothed with wild-flowers, many of which, now long cultivated in Britain, have become highly prized among us as garden-plants. Verbenas, lupines, blue and scarlet salvias, fuchsias, calceolarias, and the fragrant heliotrope, add a sense of beauty to the sense of power which the stupendous scenery imparts. The following are the most striking and distinctive physical features of the Sierra, beginning from the south: 1. The plain of Titicaca, partly in P., and partly in Bolivia, is enclosed between the two main ridges of the Andes, and is said to have an area of 30,000 miles—greater than that of Ireland. In its centre is the great Lake Titicaca, 12,846 feet above sea-level, or 1600 feet above the loftiest mountain pass (the Col of Mont Cervin) of Europe. The lake is 115 miles long, from 30 to 60 miles broad, from 70 to 180 feet deep, and 400 miles in circumference. Its shape is irregular; it contains many islands, and several peninsulas abut upon its waters. 2. The Knot of Cuzco. The mountain-chains which girdle the plain of Titicaca trend toward the north-west, and form what is called the Knot of Cuzco. The Knot comprises six minor mountain-chains, and has an area thrice larger than that of Switzerland. Here the valleys enjoy an Indian climate, and are rich in tropical productions; to the north and east of the Knot extend luxuriant tropical forests, while the numberless mountain-slopes are covered with waving crops of wheat, barley, and other cereals, and with potatoes; and higher up, extend pasture-lands, where the vicuña and alpaca feed. 3. The valley of the Apurimac, 30 miles in average breadth, and extending north-west for about 300 miles. This valley is the most populous region of Peru. 4. The Knot of Pasco. From Cuzco proceed two chains toward the north-west; they unite again in the Knot of Pasco. This Knot contains the table-land of Bombon, 12,300 feet above sea-level; as well as other table-lands at a height of 14,000 feet, the highest in the Andes; otherwise, however, the physical features of the country resemble those of the vicinity of Cuzco. 5. The vale of the river Marañon. This valley, which is upwards of 300 miles in length, is narrow, deep, and nearer the equator than any

other valley of the Sierra, and consequently, it is the hottest portion of this region; and its vegetation is thoroughly tropical in character. The conformation of the surface of the Sierra is of the most wonderful description. After the table-lands of Tibet, those of the Peruvian Andes are the highest in the world; but, unlike those of Tibet, which are mere grassy uplands, the table-lands of P. are the seat of a comparatively high civilisation, and are studded over with towns and villages, perched on heights exceeding in elevation the summits of the Jungfrau and the Wetterhorn. Nor are such towns the mere eyries of miners who are tempted to ascend thus high in search of the precious metals; for, even at this elevation, the climate is pleasant, and wheat, maize, barley, rye, and potatoes thrive well. The city of Cuzco, situated in a region of rare beauty, and enjoying a temperate climate, is 11,380 feet above sea-level, or 2000 feet higher than the Great St Bernard. The climate of the Sierra, however, is not always so charming. In general terms, it may be described as mild and variable, with moderate rains. In the district of Paucartambo, rain falls 300 days in the year. A country, however, of such an uneven surface, of snow-covered peaks and tropical valleys, embraces every variety of climate. In all the lower regions of the country the climate is warm, but healthy; in the uplands, and on the highest plateaux, it is often inclement. Violent storms beat upon the plain of Titicaca; and terrific tempests, accompanied with thunder and lightning, roll frequently around the table-lands of Pasco (q. v.); where, indeed, the climate is so cold, that but for the mines, which have attracted hither a numerous population, this region might have remained uninhabited. At the height of 9000 feet above sea-level, the mean temperature is 60° Fahr., and the variation throughout the year is not great. The highest peaks of the country reach to upwards of 22,000 feet, and many peaks in both ranges are from 17,000 to 20,000 feet high. In the Western Cordillera, and in the south of the country, are four volcanoes—Candarave, Ubina, Omate, and Arequipa. The soil of the Sierra is of great variety; but wherever it is cultivated, it is productive.

The *Montaña*, forming two-thirds of the entire area of the country, stretches away for hundreds of leagues eastward from the Andes to the confines of Brazil. On the N., it is bounded by the Amazon, on the S. by Bolivia. It consists of vast impenetrable forests and alluvial plains, is rich in all the productions of tropical latitudes, is of inexhaustible fertility, and teems with animal and vegetable life. It is still, however, almost wholly unproductive to man. The silence of its central forests has never been disturbed by the civilised explorer, and its only human inhabitants are a few scattered tribes of Indians. The *Montaña* is watered by numberless streams, and by a large number of important rivers. It belongs wholly to the basin of the Amazon. Along the head-waters of the Purus, which, flowing through beautiful forest-covered plains, approaches to within 60 miles of Cuzco, there were at one time numerous Spanish farms, where great tracts of forests had been cleared, and where crops of cocoa, sugar, and other tropical productions, were regularly raised. These farms have since 1861 been abandoned, and the encroaching forest has already obliterated their sites. The upper waters of the Purus are the headquarters of a savage and barbarously cruel tribe of wild Indians called Chunchos. These untamable savages have shewn the greatest hostility to the advance of civilisation. They murdered the settlers, or drove them to take refuge in some less advanced settlement. When Mr Markham visited this region in 1873, a few farms

by the Spaniards in the early part of the 16th c.; the middle era embraces the rule of the Incas; and the earliest era, about which exceedingly little is known, is that Pre-Incarial period, of unknown duration, during which a nation or nations living in large cities flourished in the country, and had a civilisation, a language, and a religion different, and perhaps in some cases even more advanced than those of the Incas who succeeded them, and overran their territories. Whence these Pre-Incarial nations came, and to what branch of the human family they belonged, still remain unanswered questions. Their existence, however, is clearly attested by the architectural remains, sculptures, carvings, &c., which they have left behind them. Ruins of edifices constructed both before the advent of the Incas, and contemporary with, and independently of, them, are found everywhere throughout the country. On the shores of Lake Titicaca, for example, are the ruins of Tia-Huanacu, consisting of sculptured monolithic doorways, one of which is 10 feet high, and 13 feet wide; of pillars, 21 feet high, placed in lines at regular distances; and of immense masses of hewn stone, some 38 feet long by 18 broad. In 1846, several colossal idols were excavated, some being 30 feet long, 18 wide, and 6 thick. The idols are in the form of statues, and the ears are not enlarged by the insertion in the lobes of silver rings, as those of sculptured figures, executed in Incarial times invariably are. The ancient fragments of buildings on these shores were beheld with astonishment by the earliest of the Incas, who, by their own confession, accepted them as models for their own architecture. The name Tia-Huanacu is comparatively modern, having been conferred by one of the Incas; neither history nor tradition has handed down the original name. The ruins stand at a height of 12,930 feet above sea-level, and one of the many mysteries which have crowded around this ancient site is, that this spot, in the midst of what is now generally a frozen desert, and where the rarity of the air must be so great as to be hurtful, should have been chosen as the seat, as it is generally believed to have been, of an ancient government. Of the character and degree of the civilisation of the Pre-Incarial races, almost nothing is known. It is worthy of note, however, that at Pachacamac, 25 miles south of Lima, where there are the remains of a now wholly deserted city, and of a great temple, the religion seems to have been a pure Theism; for when the Peruvians of Cuzco carried their victorious arms across the Cordilleras to this district, they beheld this temple (the doors of which are said to have been of gold inlaid with precious stones) with astonishment, not only because it rivalled if not surpassed in splendour the famous Temple of the Sun at Cuzco, but because it contained no image or visible symbol of a god. It was raised in honour of an invisible and mysterious deity, whom the inhabitants called Pachacamac, the Creator of the World (from two words of the ancient Peruvian language, *Pacha*, the earth; and *Camac*, participle of the verb *Camani*, to create). The Peruvians did not dare to destroy this temple, but contented themselves with building by its side a Temple of the Sun, to the worship of which they gradually won over the inhabitants.—For further information regarding Pre-Incarial times and races, see W. Bollaert's *Antiquities, Ethnology, &c. of South America* (Lond. 1860).

Regarding the origin of the Incas, nothing definite can be said. We have no authorities on the subject save the traditions of the Indians, and these, besides being outrageously fabulous in character, are also conflicting. It appears, however, from all the traditions, that Manco, the first Inca, first appeared

on the shores of Lake Titicaca, with his wife Mama Oello. He announced that he and his wife were children of the Sun, and were sent by the glorious Inti (the Sun) to instruct the simple tribes. He is said to have carried with him a golden wedge, or, as it is sometimes called, a wand. Wherever this wedge, on being struck upon the ground, should sink into the earth, and disappear for ever, there it was decreed Manco should build his capital. Marching northward, he came to the plain of Cuzco, where the wedge disappeared. Here he founded the city of Cuzco, became the first Inca (a name said to be derived from the Peruvian word for the Sun), and founded the Peruvian race, properly so called. Manco, or Manco Capac (i.e., Manco the Ruler), instructed the men in agriculture and the arts, gave them a comparatively pure religion, and a social and national organisation; while his wife, Mama Oello, who is also represented as being his sister, taught the women to sew, to spin, and to weave. Thus, the Inca was not only ruler of his people, but also the father and the high-priest. The territory held by Manco Capac was small, extending about 90 miles from east to west, and about 80 miles from north to south. After introducing laws among his people, and bringing them into regularly organised communities, 'he ascended to his father, the Sun.' The year generally assigned as that of his death, after a reign of forty years, is 1062 A.D. The progress of the Peruvians was at first so slow as to be almost imperceptible. Gradually, however, by their wise and temperate policy, they won over the neighbouring tribes, who readily appreciated the benefits of a powerful and fostering government. Little is clearly ascertained regarding the early history of the Peruvian kingdom, and the lists given of its early sovereigns are by no means to be trusted. They invented no alphabet, and therefore could keep no written record of their affairs, so that almost all we can know of their early history is derived from the traditions of the people, collected by the early Spaniards. Memoranda were indeed kept by the Peruvians, and, it is said, even full historical records, by means of the *quipu*, a twisted woollen cord, upon which other smaller cords of different colours were tied. Of these cross-threads, the colour, the length, the number of knots upon them, and the distance of one from another, all had their significance; but after the invasion of the Spaniards, when the whole Peruvian system of government and civilisation underwent dislocation, the art of reading the quipus, seems either to have been lost, or was effectually concealed. Thus it is that we have no exact knowledge of Peruvian history further back than about one century before the coming of the Spaniards. In 1453, Tupac Inca Yupanqui, the eleventh Inca, according to the list given by Garcilasso de la Vega, greatly enlarged his already wide-spread dominions. He led his armies southward, crossed into Chili, marched over the terrible desert of Atacama, and penetrating as far south as the river Maule (lat. 36° S.), fixed there the southern boundary of Peru. Returning, he crossed the Chilean Andes by a pass of unequalled danger and difficulty, and at length regained his capital, which he entered in triumph. While thus engaged, his son, the young Huayna Capac, heir to the name as well as the throne of his father, had marched northward to the Amazon, crossed that barrier, and conquered the kingdom of Quito. In 1475, Huayna Capac ascended the throne, and under him the empire of the Incas attained to its greatest extent, and the height of its glory. His sway extended from the equatorial valleys of the Amazon to the temperate plains of Chili, and from the

tunnelled through massive rocks, and carried across rivers and marshes. They were constructed of large slabs of freestone, fitting so closely as to require no cement, and answering perfectly the purpose for which they were intended, for the sandy wastes were converted into productive fields and rich pasture-lands, and the coast teemed with industrious inhabitants. In the valley of Santa, there were once 700,000 inhabitants; there are now only 12,000; in that of Ancullama, there were 30,000 individuals; there are now only 425. The fields on the coast were also enriched with the manure of sea-fowls, which has since come to be known as guano. Fragments of the aqueducts still remain, and are surveyed with astonishment by the traveller, who wonders that such works could have been constructed by a people who appear to have employed no machinery, had no beasts of burden, who did not know the secret of the true arch, and who did not use tools or instruments of iron. But the triumphs of industry were not more decided on the coast than they were in the *Sierra*. Here, at elevations visited now only by the eagle and the condor, the rocky heights, riven by innumerable chasms and deeply-cut precipices, were crowned with waving crops of wheat and maize. Where the mountain-slopes were too steep to admit of cultivation, terraces were cut, soil was accumulated on them, and the level surfaces converted into a species of hanging-gardens. Large flocks of llamas were grazed on the plateaux; while the more hardy vicuñas and alpacas roamed the upper heights in freedom, to be driven together, however, at stated periods, to be shorn or killed. The wool yielded by these animals, and the cotton grown in the plains and valleys, were woven into fabrics equally remarkable for fineness of texture and brilliancy of colour.

The character of the architecture of the Peruvians has already been alluded to. The edifices of Incaial times are oblong in shape and cyclopean in construction. The materials used were granite, porphyry, and other varieties of stone; but in the more rainless regions, sun-dried bricks were also much used. The walls were most frequently built of stones of irregular size, but cut with such accuracy, and fitting into each other so closely at the sides, that neither knife nor needle can be inserted in the seams. Though the buildings were not, as a rule, more than from 12 to 14 feet high, they were characterised by simplicity, symmetry, and solidity. The Peruvian architects did not indulge much in external decoration; but the interior of all the great edifices was extremely rich in ornament. In the royal palaces and temples, the most ordinary utensils were of silver and gold; the walls were thickly studded with plates and bosses of the same metals; and exquisite imitations of human and other figures, and also of plants, fashioned with perfect accuracy in gold and silver, were always seen in the houses of the great. Hidden among the metallic foliage, or creeping among the roots, were many brilliantly-coloured birds, serpents, lizards, &c., made chiefly of precious stones; while in the gardens, interspersed among the natural plants and flowers, were imitations of them, in gold and silver, of such truth and beauty as to rival nature. The Temple of the Sun at Cuzco, called *Coracancha*, or 'Place of Gold,' was the most magnificent edifice in the empire. On the western wall and opposite the eastern portal, was a splendid representation of the Sun, the god of the nation. It consisted of a human face in gold, with innumerable golden rays emanating from it in every direction; and when the early beams of the morning sun fell upon this brilliant golden disc, they were reflected from it as from a mirror, and again reflected thence about the whole temple by the numberless

plates, cornices, bands, and images of gold, until the temple seemed to glow with a sunshine more intense than that of nature.

The religion of the Peruvians, in the later ages of the empire, was far in advance of that of most barbarous nations. They believed in a Great Spirit, the Creator of the universe, who, being a spirit, could not be represented by any image or statue, nor be made to dwell in a temple made with hands. They also believed in the existence of the soul hereafter, and in the resurrection of the body. In after-life, they considered to be a condition of peace and tranquillity for the good, and of continued wearisome labour, extending over ages, for the wicked. But while they believed in the existence of the world, they also believed in other spirits, who were of some subordinate rank to the Great Spirit. Of these secondary gods, the Sun was the chief. They revered the Sun as the source of their royal dynasty; and everywhere throughout the land, altars smoked with offerings burned in his worship.

About the year 1516, and ten years before the death of Huayna Capac, the first white man landed on the western shores of South America. It was not till the year 1532, that Pizarro, at the head of a small band of Spanish adventurers, actually invaded Peru. On his death-bed, the Inca expressed a wish that the kingdom should pass to Atahualpa, one of his sons, a prince of Quito whom he had received among his concubines, and that all his other territories should fall to his son Huascar, the heir to the crown, who, according to the custom of the Incas, had inherited all its dependencies. Between these two princes, quarrels, resulting in war, arose when Pizarro entered P., he found the country occupied by two rival factions, a circumstance which he took full advantage of. Atahualpa completely defeated the forces of his brother, taken Huascar prisoner, and was now seated at Caxamalca, on the eastern side of the Andes, with a force of 177 men, of whom 150 were cavalry, the dauntless Spanish leader, in November 1532, set out to meet him. For the purpose of Atahualpa by the Spaniards, his subsequent violent death, see article ATAHUALPA. The execution of the Inca at Caxamalca, the Spaniards set out for Cuzco. Their strength had been recently increased by reinforcements, and now numbered nearly 500 men, of whom 150 were a third were cavalry. They entered the capital, 15th November 1533, having in the course of their progress toward the city of the Incas many sharp, and sometimes serious encounters with the Indians, in all of which, however, the artillery, and cavalry gave them the advantage. At Cuzco they obtained a vast amount of treasure, the one object for which the conquest was undertaken. As at Caxamalca, the art treasures were for the most part melted down, and divided among the band. Their success, however, did many of them little good, as it afforded them the means of gambling, and many of them, rich at night, found themselves penniless adventurers in the morning. Having obtained the splendid golden image of the Sun as his share of the booty, he carried it off in a single night. After stripping the temples of their treasures, Pizarro placed a son of the great Huayna Capac, on the throne of the Incas. Leaving a garrison in the capital, he then marched west to the sea-coast, with the intention of building a town, from which the more easily repel invasion from within, which should be the future capital of the empire.

members. The receipts in 1861 amounted to 21,245,832 dollars, of which 16,921,751 dollars were derived from the sale of guano; the expenditure for the same year amounted to 21,446,466 dollars. The public debt in 1862 amounted to 23,458,761 dollars. The army in the same year consisted of 16,000 men, and the navy of 17 vessels, carrying 84 guns. The country is divided into 11 departments, and two provinces with the constitution of departments; and the departments are subdivided into provinces, the provinces into districts, and the districts into parishes. Of the whole pop., 240,000 are whites, 300,000 Mestizos and dark, 40,000 Negroes, and 1,620,000 Indians.

PERUGIA, a city of Central Italy, capital of the province of the same name, stands on a lofty elevation, 800 feet high, on the right bank of the Tiber, ten miles east of the lake of the same name (ancient *Lacus Trasimenus*), and 84 miles north of Rome. It is surrounded with walls pierced with numerous gates, of which the *Arch of Augustus* (so called from the inscription *Augusta Perusia* over it, inscribed by Augustus) is the finest. It is the see of a bishop, and contains upwards of 100 churches, and about 50 monastic establishments. Its streets are wide, and there are several squares lined with massive buildings. The broad Corso, which contains the finest edifices, unites two squares, one of which is occupied by the Duomo, or cathedral, dedicated to San Lorenzo, and dating from the end of the 15th century. It is in a fine bold Gothic style, and contains many excellent paintings, carvings, &c. Many of the churches and convents are noble Gothic structures, and all of them are more or less famous for their pictures, some of which are by Raphael, Perugino, and other great masters. In the vicinity of the city, a number of tombs, supposed to mark the site of the necropolis of ancient P., were discovered in 1840. The tombs contain numerous beautiful cinerary urns, in marble and travertine; and lamps, vases, bronze armour, ornaments, paterae, &c., were also found, but have for the most part been removed to a neighbouring villa. The university of P., founded in 1320, and liberally endowed, contains a botanic garden, a cabinet of mineralogy, a museum of antiquities, and a library of 30,000 vols., with some valuable manuscripts. It is attended by from 300 to 400 students. Besides the picture-gallery of the Academy of Fine Arts, there are numerous private art-collections. P. contains also many interesting palaces, a beautiful fountain, an exchange, theatres, &c. Velvets, silk-stuffs, woollen goods, soap, brandy, and liqueurs are manufactured; and a considerable trade is carried on in corn, oil, wool, wine, and cattle. Pop. (1862), inclusive of suburbs, 44,130.

P., the ancient *Perusia*, was one of the twelve Etrurian republics. It became tributary to Rome 294 B.C. During the war between Mark Antony and Augustus, it was taken by the latter, and was burned down. It was captured by the Goths under Totila at the fall of the Western Empire. Under Pope Paul III., it was united to the Papal States. In 1860, it became a part of the Kingdom of Italy under Victor Emmanuel.

PERUGIA, LAKE OF. See *TRASIMENUS LACUS*.

PERUGINO, a celebrated Italian painter, whose real name was **PIETRO VANNUCCI**, was born at Citta della Pieve in Umbria, about 1446, but having afterwards established himself in the neighbouring and more important city of Perugia, where he had the right of citizenship, he is commonly called **Il Perugino**. It is generally thought that he studied under Andrea Verocchio at Florence. He executed numerous excellent works in various cities, particularly in

Florence, Siena, Pavia, Naples, Bologna, Rome, and Perugia. Sixtus IV. employed him in the Cappella Sistina; and his fresco of 'Christ giving the Keys to Peter' is by far the best of those painted on the side-walls of that chapel. He also, along with other contemporary painters, decorated the Stanze of the Vatican; and his works there are the only frescoes that were spared when Raphael was commissioned to substitute his works for those formerly painted on the walls and ceilings. The fact of his having had Raphael for his pupil, has no doubt in one way increased the reputation of P., but it has also in some degree tended to lessen it, as, in many of P.'s best productions, the work of Raphael is confidently pointed out by connoisseurs, and, indeed, many important pictures, at one time acknowledged as his, are now ascribed to his great pupil. His high standing as a painter, however, is established by many admirable works, in which no hand superior to his own could have operated; and, with the exception, perhaps, of Francia, who in some respects is esteemed his equal, he is now acknowledged as the ablest of the masters of that section of the early Italian school in which religious feeling is expressed with great tenderness, in pictures remarkable for delicate execution. P.'s works are also distinguished by rich and warm colouring. An excellent example of this master's work may be studied in the collection of the National Gallery, London—No. 238. The Virgin Adoring the Infant Christ.' P.'s reputation was high, when the introduction of the cinquecento style, by Leonardo and Michael Angelo, tended to throw into the shade the art of the earlier masters. Disputes ran high between the leaders of the old and new styles, and Michael Angelo is said to have spoken contemptuously of P.'s powers. This, of course, has biased Vasari's opinion in his estimate of the opponent of his idol, but P.'s reputation now stands very high, and his works are greatly esteemed. Raphael was about twelve years of age when he was entered as a pupil with P., who was then (1495) engaged on the frescoes in the Sala del Cambio (the Exchange) at Perugia. P. died at Castello di Fontignano, near Perugia, in 1524.

PERUVIAN ARCHITECTURE. Although the buildings of Peru were erected probably about the 12th c. A.D., they possess an extraordinary likeness to those of the Pelasgi in Europe. This resemblance in style must be accidental, arising probably from the circumstance, that both nations used bronze tools, and were unacquainted with iron. The Peruvian walls are built with large polygonal blocks of stone, exactly like what we call 'Cyclopean masonry.' The jambs of the doorways slope inwards, like those of Etruscan tombs, and have similar lintels. The walls of Cuzco are good examples of this style. It is further remarkable, that these walls are built with re-entering angles, like the fortifications which were adopted in Europe only after the invention of gunpowder.

PERUVIAN BARK. See **CINCHONA**.—But whilst the article Cinchona was passing through the press, an important event was taking place in the introduction of cinchona, or Peruvian Bark trees into British India. This had long been urged on the East India Company by Dr Royle, but was not undertaken till after his death. The same thing had been attempted a year or two before by the Dutch in Java, on the urgent representations of the botanist Blume, but with very imperfect success, owing to their having procured chiefly plants of a species which produces bark of very inferior quality, and yields little quinine. But Mr Markham, who

incorporated into our Syriac Bibles, are of late and uncertain date.

PESTALOZZI, JOHANN-HEINRICH, was born at Zürich, 12th January 1745. His family belonged to the middle-class gentry. He was destined for the Christian ministry, but turned aside, however, from this profession, and betook himself to the study of law. To this pursuit he did not long remain constant. The perusal of Rousseau's *Emile*, and the unsatisfactory political condition in which he found Europe, united to disgust him with the artificial life of cities, and he accordingly removed to the country, to devote his life to farming. Purchasing some waste land (after he had acquired the necessary experience), he applied himself successfully to its cultivation, marrying about the same time the daughter of a wealthy merchant. His mind continuing to be afflicted by the contemplation of the unhappy condition of the masses of the people, he devoted himself, during the intervals of his work, to the consideration of the means best suited to promote their elevation. He was convinced that, by means of a sound education, a remedy might be found for the many evils by which he was surrounded, and by which society was infected. To give effect to his theories, he converted his own house into an orphan asylum, and endeavoured, by a judicious blending of industrial, intellectual, and moral training, to afford a specimen of sound education, and one so contrived as to be practicable as a national scheme. Meanwhile, the pursuit of his benevolent enterprises involved him, after the lapse of fifteen years (1775—1790), in bankruptcy. The failure of his plans, and the democratic tendency of his opinions, brought upon him a good deal of contempt and opposition. His only consolation was having saved from degradation and neglect upwards of 100 children, and having issued several volumes on education, containing the results of his experience, and his hopes for the future of the masses. Many subsequent attempts to found schools and to give a specimen of rational scholastic training, were made by P., with varying educational success, but with invariable pecuniary embarrassment. His writings, meanwhile, increased in number and importance. The great idea which lay at the basis of his method of intellectual instruction was, that nothing should be treated of except in a concrete way. *Objects themselves* became in his hands the subject of lessons tending to the development of the observing and reasoning powers—not lessons about objects. In arithmetic, he began with the concrete, and proceeded to the abstract; and into the teaching of writing, he for the first time introduced graduation. His special attention, however, was directed to the moral and religious training of children, as distinct from their mere instruction; and here, too, graduation and a regard to the nature and susceptibilities of children, were conspicuous features of his system. Almost all P.'s methods are now substantially adopted by the instructors of elementary teachers in the Normal Schools of Europe, and to no man perhaps has primary instruction been so largely indebted. He died in 1827 at Brugg, in the canton of Basel, overwhelmed with mortifications and disappointments.

PESTH, the most populous and important commercial city of Hungary, on the left bank of the Danube, opposite Buda (q. v.), and 171 miles east-south-east of Vienna by railway. It occupies a low and level site, and contrasts strongly with the antique, picturesque, and rock-built Buda, on the other side of the river. The two cities are connected by a magnificent suspension-bridge, erected in 1849, and

which spans a water-way of about 1500 feet. Communication is also facilitated by steam-ferris, which cross the river every hour. Along the P. side of the river runs a wide quay, paved and terraced, and backed by a handsome row of buildings, 1½ miles long. The city consists of five divisions—the Inner, Leopold, Theresa, Joseph, and Francis towns. The Inner town, on the bank of the Danube, is the oldest, and the other divisions surround it in the form of a semicircle. P. is the seat of the chief judicial courts of Hungary. Its university, founded at Tyrnau, was transferred to Buda in 1781, and thence was removed hither in 1784. It is attended by upwards of 1000 students, who are taught by 50 professors, and is richly endowed. Attached to it are a museum, a botanic garden, an observatory, and a library of 75,000 volumes. Of the chief buildings and institutions, the principal are the synagogue, a large and beautiful structure, completed in 1857; the New Buildings (*Neugebäude*)—an immense edifice, now used as barracks and as an artillery dépôt; the gymnasium; military school; academy of arts; national museum, with a library of 120,000 volumes, and valuable collections of coins, medals, and antiquities; veterinary school; the national and other theatres; and the Hungarian scientific society. The town contains several important silk-spinning factories, and the principal articles of manufacture are silk, cotton, leather, jewellery, and musical instruments. The distilling of brandy, and the grinding of grain into meal and flour, are among the most important branches of industry. There are 168 flour-mills driven by water, 8 driven by wind, and 4 by steam. Four great fairs take place here annually, which draw together a concourse of more than 30,000 strangers, and at which exchanges, amounting in value to upwards of 32,000,000 florins, are made. In the course of the year, about 8000 barges unload at the quay, and the trade is chiefly in wines, raw hides, honey, wax, and an inferior spirit made from plums. After Vienna, P. has the greatest trade of any city on the Danube. Pop. 130,000, made up of the most various nationalities—Germans, Magyars, Slovaks, Greeks, and Turks—the majority of whom are Roman Catholics.

P. is mentioned for the first time in the 12th c.; but although one of the oldest towns in Hungary, its importance dates only from the reigns of Maria Theresa and Joseph II. It was desolated by the Mongols in the 13th c.; and after the battle of Mohacs (q. v.), it fell into the hands of the Turks, who held it till 1686. At the beginning of the 18th c., it was an inconsiderable town, and has only risen into importance within the last 100 years. It has suffered much from inundations of the Danube on several occasions, on one of which, in 1838, 2280 houses were destroyed. In May 1849, while Görgei, with an army of 40,000 Hungarians, occupied the heights above Buda, and bombarded the fortress, which was held for the imperial government by General Hentzi, the latter general retaliated by bombarding P.; but on the night of the 20th May, the Hungarians stormed and took the fortress; and on the following morning, raised above its battlements the standard of revolt. On the field of Rákös, in the vicinity, where the great national assemblies of the Magyars used to be held, horse-races, on the English model, now take place annually.

PESTILENCE. The terms Plague and Pestilence, corresponding to the Greek *Loimos* and the Latin *Pestis*, have, until recent times, been used indiscriminately to denote any diseases of an epidemic character which affected large masses of the community, and were remarkable for their fatality,

of a new apostle in the room of Judas Iscariot; he was the spokesman of the rest on the day of Pentecost; he it was who answered to the charges when they were brought before the council; he is the chief actor in the tragic scene of the death of Ananias and Sapphira; he was the first to break down the wall of the prejudice of race by receiving a Gentile convert into the church; he was the first to propound in the council of Jerusalem the question to be discussed as to the obligation of the Mosaic observances. The last incident of P.'s life supplied by the Scripture narrative is his presence in the council of Jerusalem, 49 A.D. Of his subsequent career, our only knowledge is derived from tradition. His special mission was to the Hebrew race, as Paul's to the Gentile; and he is supposed to have preached through Pontus, Galatia, Cappadocia, Asia, and Bithynia, chiefly to those of his own nation dispersed in these countries, all which are named in the address of the first of the two Epistles which he has left. Another tradition which, until the 16th c., met general acceptance, reports that he preached at Rome, that he took up his residence there as bishop, and that he there suffered martyrdom. This tradition is the main foundation of the Roman claim to supremacy in the church. It early encountered the opposition of the reformers; its first antagonist being a writer named Velerius, whose work was published in 1520, and who was followed by Flacius, Salsmasius, and, above all, Spanheim. This view has found a few supporters even down to our own time; but the whole current of scholarship, Protestant as well as Catholic—from Scaliger, Casaubon, Usher, Pearson, Cave, &c., down to Neander, Gieseler, Bertholdt, Olshausen, and others in our own country—has accepted the Roman tradition without hesitation. The time of his going to Rome has also been the subject of much discussion. By some, he is alleged not to have gone to Rome till the year 63, or, at all events, a short time before his martyrdom; others date his first visit as early as 42 or 43, without, however, supposing his residence after this date to have been continuous. In his first Epistle, it is implied that at the time of writing it he was at Babylon; and the name Babylon is by many critics held to be employed as a mystic designation of Rome, in accordance with a practice not unusual with the Hebrews and other orientals; but there is nothing to fix very conclusively the date of this Epistle. He is held by Roman Catholic writers to have fixed his see at Antioch before his coming to Rome; but of this supposed event also, the date is uncertain. His martyrdom is fixed in, with much probability, the year 66, and is supposed to have been at the same time and place with that of St Paul. P. was sentenced to be crucified, and, according to the tradition (preserved by Eusebius from Origen), prayed that he might be crucified with his head downwards, in order that his death might exceed in ignominy that of his Divine Master.

PETER, EPISTLES GENERAL OF, the name given to two Epistles contained in the canon of the New Testament. They are called *general*, because they are not addressed to particular churches or persons, like those of St Paul; but (as in the case of the 1st Epistle) to all the Christians scattered throughout Asia Minor, or (as in the case of the 2d) to the entire body of Christians without exception. The objects of the 1st Epistle are to strengthen believers under trials; to exhort them to the earnest performance of all duties—personal, social, and domestic; and to demonstrate how thoroughly that performance depends on a spiritual recognition of Christ and his work. There is a strong eschatological tendency

in the Epistle; the apostle seems to grow more intensely serious, under the conviction that 'the end of all things is at hand' (chap. iv. 7). That the Epistle is the composition of Peter is very generally admitted. The external evidence is singularly strong; while the internal, derived from a consideration of style, sentiment, and doctrine, is equally so. We see in every sentence the ardent, impassioned, practical, unspeculative character of Peter, who held with a fine Hebraic vehemence of faith the great facts and principles of Christianity, but could not, like the more subtle and logical Paul, give them a systematic representation. Many critics have warmly praised the beauty and strength of the language.—The *Second Epistle* stands in a very different position from the first. So far as external authority is concerned, it has hardly any. The most critical and competent of the Fathers were suspicious of its authenticity; it was rarely if ever quoted, and was not formally admitted into the canon till the Council of Hippo, 393 A.D. The internal evidence is just as unsatisfactory. The great difference of style between it and the 1st Epistle is universally admitted. Bunsen, Ullmann, and Lange hold indeed that the second chapter is an interpolation, but consider the first and third genuine. Many of the ablest critics, however, regard the whole Epistle as a fabrication, and believe that its contents prove it was meant as an attack on the Gnosticism of the 2d century. [See the remarks on the Second Epistle of Peter in Neander's *Geschichte der Pflanzung und Leitung der Kirche durch die Apostel*.] The principal arguments adduced for maintaining its apostolic character are—1, that its rejection would endanger the authority of the canon; 2, that it is inexplicable how the church should have received it if it had not thought that Peter was the author.

PETER LOMBARD. See LOMBARD, PETER.

PETER-PENCE, the name given to a tribute which was collected in several of the western kingdoms, and offered to the Roman pontiff, in reverence of the memory of St Peter, of whom that bishop was believed to be the successor. From an early period, the Roman see had been richly endowed; and although its first endowments were chiefly local, yet as early as the days of Gregory the Great, large estates were held by the Roman bishops in Campania, in Calabria, and even in the island of Sicily. The first idea, however, of an annual tribute appears to have come from England, and is by some ascribed to Ina (721 A.D.), king of the West Saxons, who went as a pilgrim to Rome, and there founded a hospice for Anglo-Saxon pilgrims, to be maintained by an annual contribution from England; by others, to Offa and Ethelwulf, at least in the sense of their having extended it to the entire of the Saxon territory. But this seems very uncertain; and although the usage was certainly long anterior to the Norman Conquest, Dr Lingard is disposed not to place it higher than the time of Alfred. The tribute consisted in the payment of a silver penny by every family possessing land or cattle of the yearly value of 30 pence, and was collected in the five weeks between St Peter's and St Paul's Day and August 1. In the time of King John, the total annual payment was £199, 8s., contributed by the several dioceses in proportion, which will be found in Lingard's *History of England*, vol. ii. p. 329. The tax called *Romescot*, with some variation, continued to be paid till the reign of Henry VIII., when it was abolished. By Gregory VII., it was sought to establish it for France; and other partial or transient tributes are recorded from Denmark, Sweden, Norway, and Poland. This tribute,

and aided by Aragon, France, and the pope. P., however, by promising to England the sea-board of Biscay, with the provinces of Guipuzcoa and Logrono, and supplying a contribution of 56,000 florins, prevailed upon Edward the Black Prince to espouse his cause. Edward invaded Castile in the spring of 1367, totally defeated Henry and Du Guesclin at Navarrete (April), taking the latter prisoner (releasing him almost immediately after), and speedily restoring P. to the throne. But the king disgusted his chivalrous ally by his cruelty to the vanquished, and paid no heed to his remonstrances; Edward accordingly repassed the Pyrenees, and left the misguided monarch to his fate. The whole kingdom groaned under his cruelties; rebellions broke out everywhere; and, in autumn 1367, Henry returned with 400 lances, the people immediately flocking to his standard. P.'s scanty and ill-disciplined forces were routed at Montiel (14th March 1369), and himself compelled to retire for safety within the town, whence he was treacherously decoyed and captured by Du Guesclin. He was carried to a tent, where a single combat took place between him and Henry, in which the latter would have been slain, had not some of his followers come to his aid, and slain the unfortunate P., 23d March 1369.

PETER I., ALEXIEVITCH, Czar of Russia, generally denominated **PETER THE GREAT**, was the son of the Czar Alexei Mikailovitch by his second wife, Natalia Naryskine, and was born at Moscow, 9th June 1672. His father, Alexei, died in 1676, leaving the throne to his eldest son, Feodor, P.'s half-brother. This prince, however, died in 1682 without issue, after naming P. as his successor, to the exclusion of his own full brother, Ivan. This step immediately provoked an insurrection, fomented by the children of the Czar Alexei's first marriage, the most prominent among whom was the grand-duchess Sophia, a woman of great ability and energy, but of unbounded ambition. Disdaining the seclusion customary among the females of the royal family, she shewed herself to the *Strelitz* (q.v.), excited them to fury by an ingenious story of the assassination of her brother Ivan, and then let them loose on the supporters of P.'s claims. After a carnage of three days, during which more than sixty members of the most noble families of Russia were massacred, she succeeded in obtaining the coronation (July 1682) of Ivan and P. as joint rulers, and her own appointment as regent. Up to P.'s coronation his education had been greatly neglected, but after this time he became acquainted with Lieutenant Franz Timmerman, a native of Strasburg, who gave him lessons in the military art and in mathematics; after which he had the good fortune to fall under the guidance of Lefort (q.v.), a Genoese, who initiated him into the sciences and arts of civilisation, and by shewing him how much Muscovy was in these respects behind the rest of Europe, influenced the whole of his future career. Lefort also formed a small military company out of the young men of noble family who attended P., and caused P. himself to pass, by regular steps, from the lowest (that of drummer) to the highest grade in it, rendering him all the while amenable to strict discipline. This course of training, in all probability, saved P. from becoming the mere savage despot, which his brutal and passionate disposition, and indomitable energy inclined him to be; it also protected him from the jealousy of his half-sister, the regent Sophia, who, seeing him absorbed in military exercises and other studies, imagined that he had wholly given himself up to amusement. She, however, soon discovered her error, for P., contrary to her wishes, married (February 1689), by his mother's advice, Eudoxia

Feodorowna, of the family of Lapoukin; and in October of the same year, called upon his sister to resign the government. In the ensuing contest, P. was at first worsted, and compelled to flee for his life; but he was speedily joined by the foreigners in the Russian service, with a Scotchman named Patrick Gordon (q.v.) and the Swiss Lefort at their head; and the *Strelitz*, who were his antagonist's mainstay, flocking to his standard, she resigned the contest, and was shut up in a convent, whence, till her death, in 1704, she did not cease to annoy him by her intrigues. On October 11, 1689, P. made his public entry into Moscow, where he was met by Ivan, to whom he gave the nominal supremacy and precedence, reserving the sole exercise of power for himself. Ivan only enjoyed his puppet sovereignty till 1696. Though P. was all his life under the dominion of ungovernable passions and sensual habits, yet during great part of his reign he was so exclusively engaged in projecting and carrying out his schemes for the regeneration of Russia, that his gross animal nature had little opportunity of displaying itself.

His first care, on assuming the government, was to form an army disciplined according to European tactics, in which labour he was greatly aided by the valuable instructions of Gordon and Lefort, both of whom were military men, and had served in some of the best disciplined armies of Western Europe. He also laboured to create a navy, both armed and mercantile; but at this period Russia presented few facilities for such an attempt, for she was shut out from the Baltic by Sweden and Poland (the former of whom possessed Finland, St Petersburg (then called Ingria), and the Baltic provinces), and from the Black Sea by Turkey, which, extending along the whole of the north coast, had reduced that sea to the rank of an inland lake; leaving only the White Sea and the Arctic Ocean, with the solitary port of Archangel, available for the Russian navy. P. thinking the possession of a portion of the Black Sea would best supply the required facilities of accessible sea-board and port, declared war against Turkey, and took (1696) the city of Azof at the mouth of the Don, after a long siege, which the ineffective condition of his newly-disciplined army compelled him to convert into a blockade. Skilled engineers, architects, and artillerymen were now invited from Austria, Venice, Prussia, and Holland; ships were constructed; the army further improved both in arms and discipline; and many of the young nobility ordered to travel in foreign countries, chiefly in Holland and Italy, for the purpose of acquiring such information as might be useful in the modernisation and civilisation of their country. They were ordered to take special notice of all matters in connection with ship-building and naval equipments. Others were sent to Germany to study the military art. Not quite satisfied with this arrangement, P. was eager to see for himself the countries for which civilisation had done so much, and which had so highly developed the military art, science, trade, and industrial pursuits; so after repressing a revolt of the *Strelitz* (February 1697), and dispersing them among the various provinces, he intrusted the reins of government to Prince Romonadofski, assisted by a council of three, and left Russia in April 1697, in the train of an embassy of which Lefort was the head. In the guise of an inferior official of the embassy he visited the three Baltic provinces, Prussia, and Hanover, reaching Amsterdam, where, and subsequently at Saardam, he worked for some time as a common shipwright. His curiosity was excessive; he demanded explanations of everything which he did not understand; and to his practice of ship-building

PETER I.) by his wife the Princess Charlotte of Brunswick-Wolfenbützel, and was born 23d October 1715 at St Petersburg. On the death of the Czarina Catharine I, he ascended the throne, May 17, 1727, in accordance with a decree of Peter the Great, which enjoined that each czar should name his successor; and the ambitious Menchikoff, who hoped to govern more easily in the name of a minor, prompted the empress to choose P. In order to secure himself in his high position, Menchikoff affianced one of his daughters to the youthful czar, and compelled his relative, Anna Petrowna, and her husband, the Duke of Holstein, to retire to their own estates. But, notwithstanding these and other precautions, his power was overturned by a mere child, a playfellow of the boy-ruler, who was of the powerful family of Dolgorouki. Instigated by his friends, this boy, Ivan Dolgorouki, opened the eyes of his sovereign to the humiliating dependence in which he was held by Menchikoff, and inspired him with a strong desire to free himself. The plan succeeded, and the minister and his family were exiled to Siberia, the Dolgorouki family taking their place as favourites. The marriage of a lady of this family with P. had been arranged, and was almost on the point of being celebrated, when he was seized with small-pox, and died at St Petersburg, January 29, 1730. During his reign, the three Caspian provinces, Asterabad, Ghilan, and Mazanderan, which had been seized by Peter the Great, were recovered by Persia.

PETER III. FEODOROVITCH, Czar of Russia, grandson of Peter the Great (being the son of his eldest daughter Anna Petrowna, wife of Karl Friedrich, Duke of Holstein-Gottorp), was born at Kiel, March 4, 1728, and on November 18, 1742, was declared by the czarina Elizabeth (q. v.), her successor on the throne of Russia. From the time of his being publicly proclaimed heir, he lived at the Russian court; and, in obedience to the wishes of the czarina, married Sophia-Augusta, a princess of Anhalt-Zerbst, who, on entering the Greek Church (a necessary condition of marriage of a foreigner with the czar present or presumptive), assumed the name of Catharina Alexiowna. P. succeeded Elizabeth on her death, June 5, 1762; and his first act of authority was to withdraw from the confederate league of France, Austria, and Russia against Prussia, restoring to the heroic monarch of the latter kingdom, Frederic II., the provinces of Prussia Proper, which had been conquered during the Seven Years' War, and sending to his aid a force of 15,000 men; a line of conduct which seems to have been prompted solely by his admiration for the Prussian sovereign. He also recalled many of the political exiles from Siberia, among whom were L'Estocq, Munnich, and the Duke of Courland; abolished the sanguinary law which proscribed any one who should utter a word against the Greek church, the czar, or the government; and then attempted the realisation of his favourite project, which was to recover from Denmark that portion of Slesvig which had been ceded to her in 1713, and to avenge the tyranny and annoyances to which his family—that of Holstein-Gottorp—had been subjected. But before the army he had despatched could reach its destination, a formidable conspiracy, headed by his wife, and supported by the principal nobles, had broken out against him. This conspiracy originated in the general discontent which was felt at the czar's conduct and government; for the nobility were offended at his liberal innovations, and the preference he shewed for Germans; the people and clergy, at his indifference to the national religion, and his ill-concealed contempt for Russian manners and customs; while the whole nation

murmured at his servility to Frederic II. of Prussia. His wife had still deeper cause for dislike; for though he was himself addicted to drunkenness and debauchery, he never ceased to reproach her with her infidelities, and had even planned to divorce her, disinherit her son Paul (q. v.), and elevate his mistress Elizabeth Woronzof to the conjugal throne. The revolution broke out on the night of the 8th July 1762; P. was declared to have forfeited his crown, and his wife Catharine was proclaimed czarina as Catharine II. (q. v.) by the Guards, the clergy, and the nobility. P., who was then at Oranienbaum, neglecting the counsels of Field-marshal Munnich, who proposed to march at once on the capital at the head of the regiments which were still faithful, or at anyrate to take some possession of Cronstadt and the fleet, soon found even the opportunity of flight cut off, and was compelled to submit. He abdicated the crown on 16th July, and on the 14th of the same month was put to death by Orlof (q. v.), to secure the safety of the conspirators.

PETERBOROUGH, an episcopal city and parliamentary borough of Northamptonshire, stands on the left bank of the Nen—which is thus far navigable for boats—37 miles north-east of Northampton, and 76 miles north-north-west of London by railway. The Great Northern, the Eastern Counties, the Northampton and Peterborough, and the Midland Counties' railways pass the city, and have stations here. P. is regularly laid out, has an excellent grammar-school with an endowment, a corn-exchange in the Italian style, a jail and house of correction, a handsome parish-church, and a number of chapels and meeting-houses, schools, and charitable institutions.

But the great edifice of P. is the famous cathedral, which holds a high, if not the highest rank among English cathedrals of the second class. The choir and eastern aisles of the transept (about 1118—1133) are early Norman; the transept (1155—1177) is middle Norman; the nave (1177—1193) is late Norman; the western transept (dating from the same period), is transition Norman; the west front, which, as a portico (using that term in its classical sense), is said to be the grandest and finest in Europe, is early English; and the eastern aisle (begun in 1438, but not completed till 1528), is Perpendicular. The beautiful western front consists of three arches 81 feet in height, supported by triangular piers detached from the west wall. Each arch is surmounted by a beautiful pediment and cross. The front is flanked on each side with turrets 156 feet high, and crowned with pinnacles. The roof of the nave is painted to lozenge-shaped divisions, containing figures of kings, bishops, grotesques, &c., in colours. A central tower, lantern-shaped, rises at the intersection of the nave and transept. In the north-choir aisle, a slab of blue stone still covers the remains of Catharine of Aragon. On the stone is carved the simple inscription, 'Queen Catharine, A.D. 1538.' In July 1587, the remains of Mary, Queen of Scots, were brought here from Fotheringay for interment, and here they rested until, twenty-five years after, they were removed to Westminster Abbey. The entire length of the cathedral is 476 feet 5 inches; the breadth of nave and aisles, 78 feet; height of the ceiling of the church, 78 feet; breadth of the church at the great transepts, 203 feet; height of lantern, 135 feet; length of western front, 156 feet; height of central tower from the ground, 150 feet.

P. carries on an active trade in corn, coal, timber, lime, bricks, and stone. The borough returns two members to the House of Commons. Pop. of parliamentary borough (1851), 8672; (1861), 11,735.

walking on the sea, called the Navicella, designed by Giotto in 1298, and preserved from the old basilica. The central bronze doors are also relics saved from the old church. On entering the interior of the cathedral, its enormous size does not produce the impression its grandeur of proportions should do on the spectator. This arises from the details being all of an excessive size. The pilasters of the nave, the niches, statues, mouldings, &c., are all such as they might have been in a much smaller church, magnified. There is nothing to mark the scale, and give expression to the magnitude of the building. The figures supporting the holy water fountain, for example, appear to be those of cherubs of a natural size, but when more closely approached, turn out to be six feet in height, and the figures in the niches are on a still more colossal scale. The cathedral is 613 feet long, and 450 feet across the transepts. The arch of the nave is 90 feet wide, and 152 feet high. The diameter of the dome is 195½ feet. From the pavement to the base of the lantern is 405 feet, and to the top of the cross 434½ feet. The dome is thus 50 feet wider, and 64 feet higher than that of St Paul's (q. v.) in London.

The walls of the interior are adorned with plates of the richest marbles, and copies of the most celebrated paintings executed in mosaic. The arch piers have two stories of niches with statues of saints, but these, unfortunately, are in a debased style of art. The pavement is all in marbles of different colours, arranged in beautiful patterns designed by Giacomo della Porta. The dome is, however, the finest part of the cathedral; it is supported on four great arches. Immediately under the dome stands the high altar over the grave of St Peter. It is surmounted by a magnificent baldacchino or canopy, in bronze, which was designed by Bernini in 1633, and executed with bronze stripped from the Pantheon by Pope Urban VIII. Beneath the high altar is the shrine, in which 112 lamps burn day and night. The building is adorned with many remarkable monuments and statues, some of them by Michael Angelo, Canova, and Thorwaldsen. The most of the monuments are erected in memory of the popes, but there is one to 'James III., Charles III., and Henry IX., kings of England,' the remains of the exiled Stuarts being buried in the vaults beneath. The 'Grotte Vaticane,' or crypt, has been most carefully and religiously preserved during all the changes and works of the cathedral; so much so, that the ancient pavement remains undisturbed.

As a work of architectural art, St Peter's is the greatest opportunity which has occurred in modern times; but, notwithstanding the great names of the men who were engaged upon the work, it is universally admitted to be a grand and lamentable failure.

PETER'S, ST, COLLEGE, Cambridge, commonly called Peter-House, was founded before any other college now existing in England—viz., in 1257, by Hugh de Balsham, Bishop of Ely, and was endowed by him in 1282, with a maintenance for a master and 14 fellows. In addition to the 14 original foundation-fellows, there are eight bye-fellows on different foundations, and 23 scholars. The master is elected by the society.

PETERSBURG, a city and port of entry of Virginia, U. S., on the south bank of the Appomattox river, 12 miles above its junction with James River, at City Point. It is 30 miles south of Richmond. Five railways contribute to make it the third city in the state. It has gas and waterworks, custom-house, court-house, mechanics'

hall, public library of 5000 vols.; 4 banks of issue; 4 savings banks; 3 daily and 2 weekly papers; 14 churches, 4 of which are for people of colour; 5 manufacturing establishments, among which 20 manufacture 26,000,000 lbs. of tobacco, the chief staple. In the campaign of 1864, Lieutenant-General Grant, commander of the Federal army, failing to take Richmond, besieged P., and was repulsed in several attacks by General Beauregard, with heavy loss. Pop. (1860) 18,266.

PETERSBURG, St. See **St PETERSBURG**.

PETERSFIELD, a parliamentary borough and market-town in Hampshire, 23 miles east-north-east of Southampton, and 55 miles south-west of London by railway. It is a pleasant country-town, and contains a Norman parish chapel of the 12th c., and an educational institution, called Churches College. An equestrian statue of William III., once richly gilt, stands in the market-place. P. returns a member to the House of Commons. Pop. (1861) of town, 1466; of borough, 5655.

PETERWARDEIN, the capital of the Slavonian-Servian military frontier, and one of the strongest fortresses in the Austrian dominions, is situated in a marshy, unhealthy locality on the right bank of the Danube, 50 miles north-west of Belgrade. The ordinary garrison consists of 2000 men, besides which the town and suburbs contain a population of about 4600, mostly Germans. The most ancient part of the fortifications, the Upper Fortress, is situated on a rock of serpentine, which on three sides rises abruptly from the plain. P., situated on a narrow peninsula formed by a loop of the Danube, occupies the site of the Roman *Acumincum* (acuminc point), and is said to have been named in honour of Peter the Hermit, who marshalled here the soldiers of the first crusade. In 1688, the fortifications were blown up by the imperialists, and the town was soon after burned to the ground by the Turks; but at the Peace of Passarowitz, on 21st July 1718, it remained in the possession of the emperor. It was here that, on 5th August, 1716, Prince Eugene obtained a great victory over the Grand Vizier Ali.

PÉTIOLE. See **LEAVES**.

PÉTION DE VILLENEUVE, JÉRÔME, not I for the part he played in the first French Revolution, was the son of a procurator at Chartres, and was born there in 1753. He was practising as an advocate in his native city, when he was elected in 1789 a deputy of the *Tiers Etat* to the States-General. His out-and-out republican principles, and his facile oratory, sonorous rather than eloquent, quickly made him popular, though he had an essentially mediocre understanding, and was altogether a windy, verbose personage. He was a prominent member of the Jacobin Club, and a great ally of Robespierre; the latter was called the 'Incorruptible,' and P. the 'Virtuous.' He was sent along with Barnave and Latour-Maubourg to bring back the fugitive royal family from Varennes, and in the execution of this commission he acted in an extremely unfeeling manner. He afterwards advocated the deposition of the king, and the appointment of a popularly elected regency, and along with Robespierre received, 30th September 1791, the honours of a public triumph. On the 18th of November, he was elected *Maire de Paris* in Bailly's stead, the court favouring his election, to prevent that of Lafayette. In this capacity he encouraged the demonstrations of the lowest classes, and the arming of the populace. But as the catastrophe drew near, he awoke to a sense of its terrible nature, and sought in vain to arrest the torrent. On the triumph of the

PETRA—PETRARCA.

by an extraordinary chasm or ravine, called the Sik, narrowing as it proceeds till in some places the width is only 12 feet, while the rocky walls of red-sandstone tower to the height of 300 feet. Hardly a ray of light can pierce this gloomy gorge, yet it was once the highway to P., and the remains of an ancient pavement can be traced beneath the brilliant oleanders that now cover the pathway. All along the face of the rocky walls are

rows of cave-tombs, hewn out of the solid stone, and ornamented with façades. These are also numerous elsewhere. Originally, they were probably dwellings of the living, not of the dead—a supposition justified by an examination of their interior, but when the Nabatheans built the city proper in the little basin of the hills, they were in all likelihood abandoned, and then set apart as the family-sepulchres of those who had formerly been 'dwellers in the clefts of



Petra—Mount Seir.—From Laborda.

the rocks.' The principal ruins are—1. *El-Khuzneh* ('the Treasure-house'), believed by the natives to contain, buried somewhere in its sacred enclosure, the treasures of Pharaoh. It directly faces the mouth of the gorge we have described, and was the great temple of the Petreans. 2. *The Theatre*, a magnificent building, capable of containing from 3000 to 4000 spectators. 3. *The Tomb with the Triple Range of Columns*. 4. *The Tomb with Latin Inscription*. 5. *The Deer or Convent*, a huge monolithic temple, hewn out of the side of a cliff, and facing Mount Hor. 6. *The Acropolis*. 7. *Kuer Farón*, or Pharaoh's palace, the least incomplete ruin of Petra. Most of the architecture is Greek, but there are also examples of the influence of Egypt, pyramidal forms being not unknown.

PETRARCA, FRANCESCO, the first and greatest lyric poet of Italy, was the son of a Florentine notary named Petracco, who belonged to the same political faction as the poet Dante, and went into exile along with him and others in 1302. Petracco took up his residence at Arezzo, and here the future poet was born in the month of July 1304. His original name was Francesco di Petracco, which he subsequently changed to that by which he is now known. When P. was about eight years of age, his father removed to Avignon, where the papal court was then held; and here, and at the neighbouring town of Carpentras, the youth studied grammar, rhetoric, and dialectics. Contrary to his own inclination, but in compliance with the wish of his father, he spent seven years in the study of law at Montpellier and Bologna; but in 1326 his father

died, and P. now devoted himself partly to the gaieties of Avignon, and partly to classical studies, or rather to the study of the Latin classics, as it was only towards the end of his life that he attempted to master Greek. At this time, he ranked among his friends, the jurist Soranzo, John of Florence, the apostolic secretary, Jacopo Colonna, Bishop of Lombes in Gascony, and his brother, the Cardinal Giovanni, Azzo da Corregio, lord of Parma, and many other noble and learned personages. His illustrious admirers—among whom were emperors, popes, dukes, kings, and sovereign-dukes—obviously thought themselves honoured by their intimacy with the son of a poor notary, and some were even forward in proffering him their favour. But the great event in P.'s life (viewed in the light of its literary consequences) was his tenderly romantic and ultimately pure passion for Laura—the golden-haired, beautiful Frenchwoman. Some slight obscurity still hangs over his relation to this lady, but it is almost certain that she was no less a paragon of virtue than of loveliness. He met her on the 6th of April 1327 in the church of St Clara at Avignon, and at once and for ever fell deeply in love with her. The lady was then 19, and had been married for two years to a gentleman of Avignon, named Hugues de Sade. For ten years P. lived near her in the papal city, and frequently met her at church, in society, at festivities, &c. He sung her beauty and his love in those sonnets whose mellifluous conceits ravished the ears of his contemporaries, and have not yet ceased to charm. Laura was not insensible to a worship, which made an

head, throat, and back jet-black, the forehead snowy-white, one longitudinal and two oblique bands of white on the wings, and the breast bright scarlet; the female is brown, with red breast. There are several other species, birds of beautiful plumage.

PETRO'LEUM. See **NAPHTHA**. In consequence of the danger attending the storing and keeping of petroleum, an act of parliament was passed in 1861 (25 and 26 Vict. c. 66) to regulate the subject, putting it on a similar footing to gunpowder. A licence is required to keep large quantities, which is obtained in England from the aldermen of the city of London, the metropolitan board, the mayor and aldermen of boroughs, or the harbour commissioners, according to the locality where it is proposed to be kept; and in other places, in England and Scotland, from two justices of the peace. If the licence is refused, the party may appeal to the Home Secretary. Not more than forty gallons must be kept within fifty yards of a dwelling-house or a warehouse for goods, except in pursuance of a licence, under a penalty of £20 per day. One moiety of the penalty is given to the informer. A search-warrant may be obtained from justices, in case it is suspected that the act is violated.

PETRO'LOGY (Gr. science of rocks), a term recently introduced into geology to designate particular aspects of the study of rocks, apart from their organic contents. By some, it is confined to an examination of their structure and composition; by others, it is extended to the study of rock-masses, their planes of division, their forms, their position and mutual relations, and other characters not bearing on the question of the geological time of their production.

PETROMY'ZON. See **LAMPREY**.

PETRONEL, an ancient and clumsy description of pistol.

PETRONIUS, C., a Roman voluptuary at the court of Nero, whose profligacy is said to have been of the most superb and elegant description. We know, however, very little about him. He was at one time proconsul of Bithynia, was subsequently appointed consul, and is certified as having performed his official duties with energy and prudence. But his grand ambition was to shine as a court-exquisite. He was a kind of Roman *Brummell*, and Nero thought as highly of him as did the Prince Regent of the famous Beau. He was entrusted by his imperial master and companion with the charge of the royal entertainments, and thus obtained (according to Tacitus) the title of *Arbiter Elegantie*. Nero would not venture to pronounce anything *comme il faut*, until it had received the approval of the oracle of Roman fashion. The influence which he thus acquired was the cause of his ruin. Tigellinus, another favourite of Nero, conceived a hatred of P., brought false accusations against him, and succeeded in getting his whole household arrested. P. saw that his destruction was inevitable, and committed suicide (66 A. C.), but in a languid and graceful style, such, he thought, as became his life. He opened some veins, but every now and then applied bandages to them, and thus stopped the flow of blood, so that he was for a while enabled to gossip gaily with his friends, and even to appear in the streets of Cumæ before he died. We are told that he wrote, sealed, and despatched to Nero, a few hours before his death, a paper containing an account of the tyrant's crimes and flagitious deeds. It has been generally supposed that P. is the author of a well-known work entitled, in the oldest MSS., *Petronii Arbitri Satyricon*, a series of fragments belonging apparently

to a very extensive comic novel or romance (see **NOVELS**), the greater portion of which has perished, but there is really no satisfactory evidence to shew whether or not he was so. It is probable, however, that the work belongs to the 1st c. A. D. The fragments exhibit a horrible picture of the depravity of the times; but there is no indication that the author disapproves of what he describes. The *editio princeps* of the fragments appeared at Venice in 1499; later editions are those of Barmann (Traj. ad Rhen. 1709; 2d edit. Amst. 1743), and of Antonius (Leip. 1781).

PETROPAVLO'VSK, a small port of Russian Siberia, near the mouth of the river Avatcha, on the east coast of the peninsula of Kamchatka. Lat. 53° N., long. 158° 44' E. It has only 691 inhabitants, and has lost much of its former importance since its desertion by the Russians in 1855, and the removal of its garrison to Nikolaevalk.

PETROZAVO'DSK, an important mining-town in the north of European Russia, capital of the government of Olonetz, stands on the western shore of Lake Onega, 300 miles by water north-east of St Petersburg. A cannon-foundry was erected here in 1701 by Peter the Great, who himself had discovered the rich resources of this northern region in iron and copper ore. The town itself dates from the year 1703; and from that to the present time, it has been the great centre of the mining industry of the government. The Alexandrovsky arm-factory is specially deserving of notice. It was founded in 1773, and, besides other arms, it has produced in all 30,000 pieces of cast-iron ordnance. Works are also fitted up for the preparation of steel. Wood abounds in the vicinity, and there is easy communication by water with St Petersburg. Pop. 10,648.

PETSH, or **IPEK** (i. e., silk), a town of European Turkey, in Albania, stands on the Bistritz, or White Drin, 65 miles north-east of Scutari. It is a pleasant town; the houses are large and handsome, and, as a rule, have gardens attached, in which fruit and mulberry-trees are cultivated. Water, from the river, is led up into all the houses. Silk is extensively made, tobacco and fruits are largely cultivated, and arms manufactured. P. was formerly the residence of the Servian patriarcha. Pop. 8000.

PETTY BAG OFFICE, one of the branches of the Court of Chancery, now regulated by statutes 11 and 12 Vict. c. 48, and 12 and 13 Vict. c. 108. The clerk of the petty bag, an officer appointed by the Master of the Rolls, draws up writs of summons to parliament, *Conjéts d'élire* for bishops, writs of *Scire facias*, and all original writs. A great deal of miscellaneous business is also transacted in the petty bag office, which the Lord Chancellor and Master of the Rolls are empowered to regulate and transfer from time to time. In the petty bag office may be brought any personal action by or against any officer of the Court of Chancery, in respect of his service or attendance.

PETTY OFFICERS in the royal navy are an upper class of seamen, analogous to the non-commissioned officers in the army. They comprise the men responsible for the proper care of the several portions of the ship, the foremen of artificers, the signalmen, and many others. They are divided into three classes: chief petty officers, at 2s. 3d. a day; 1st class working petty officers, at 2s. a day; and 2d class working petty officers, at 1s. 10d. a day. Petty officers are appointed and can be degraded by the captain of the ship. Her efficiency much depends on this useful class of sailors.

the name of the Garden of Herault. It is famous for its healthy climate and clear sky. The vicinity produces excellent wine, and woollen and linen goods are manufactured. The trade, however, is chiefly in liquors, and P. is known as one of the principal brandy-markets of Europe. Pop. 6609.

PFEFFERS an extraordinary and much-visited locality in the Canton of St Gall, Switzerland, five miles south-east of Sargans. It has been famous since the middle of the 11th c. for its hot baths, situated 2180 feet above sea-level, and 520 feet above the village of Ragatz. The old baths of P. are built on a ledge of rock a few feet above the roaring torrent of the Tamina, and are hemmed in by walls of rock towering above them to the height of 600 feet, and so far burying the baths within the gorge, that even in the height of summer, sunlight appears above them only from ten to four. Above the old baths, the walls of the ravine of the Tamina contract until they meet, covering up the river, which is there seen from a cavernous gap. The hot-springs are reached from the baths by means of a railed platform. This platform, leading to the hot spring, is secured to the rocks, and the Tamina churns its way through the cleft 30 or 40 feet below. The waters of the hot spring are now conveyed to Ragatz (about two miles below P.) by wooden pipes, 12,500 feet long. The waters, as they issue from the spring, have a temperature of 100° Fahr. A pint of the water, which is used both for drinking and bathing, contains only about three grains of saline particles.

PFEIFFER, IDA (*née* REYER), a celebrated female traveller, was born at Vienna, October 15, 1797, and from her earliest years shewed a resolute and fearless, but not unfeminine disposition. In 1820, she married an advocate, named Pfeiffer, from whom she was obliged to obtain a separation, after she had borne him two sons, Oscar and Alfred, whose education devolved on herself. When she had settled them in life, and was free to act as she pleased, she at once proceeded to gratify, at the age of 45, her long-cherished inclination for a life of travel and adventure. Her first expedition was to the Holy Land. She left Vienna in March 1842, and returned in December of the same year, having traversed, alone and without guide, European and Asiatic Turkey, Palestine, and Egypt. She published an account of her eastern rambles in the following year (*Reise einer Wienerin in das Heilige Land*), which, like all her other works, has gone through many editions, and been translated into French and English. In 1845, she visited Northern Europe—Sweden, Norway, Lapland, and Iceland—and recorded her impressions in her *Reise nach dem Skandinavisch, Norden und der Insel Island* (2 vols. 1846). But these journeys, which would have satisfied most women, were but little excursions in the eyes of this insatiable nomad, and only served to whet her appetite for something vaster. She resolved on a voyage round the world; and on the 23th of June 1846, sailed from Hamburg in a Danish brig for Brazil. Her descriptions of the scenery of that country and of the inhabitants—both native Indians and Brazilians—are exceedingly interesting. She then sailed round Cape Horn to Chile, and thence, after some time, across the Pacific to Otaheite, China, and Calcutta; crossed the Indian peninsula to Bombay, whence she took ship for the Persian Gulf, landed at Bassora, traversed a great part of Western Asia, Southern Russia, and Greece, and re-entered Vienna, November 4, 1848. Two years later, she published a narrative of her travels and adventures, entitled *Eine Frauensahrt um die Welt* (Vienna, 1850, 3 vols.). As a small recognition

of her services, and of the singular energy, fortitude, and perseverance of her character, the Austrian government granted Madame P. a sum of £100. She now determined to go round the world again, but by a different route. Proceeding to England, she, in May 1851, took ship for Sarawak, rounding the Cape of Good Hope, penetrated alone to the heart of Borneo, visited Java and Sumatra, lived for a time with some cannibal tribes, and sailed from the Moluccas to California, thence to Peru, scaled the peaks of Chimborazo and Cotopaxi, made a run through the principal of the United States, and returned to London in 1854. This second voyage, signalised by several scientific observations, is described in *Meine Zweite Weltreise* (Vien. 1856). But the more she travelled, the fiercer became her hunger for movement. In September 1856, she set out on what was to be her last expedition—namely, to Madagascar. After enduring terrible hardships, she got away, and came home to Vienna—to die. Her death took place October 28, 1858.

PFORZHEIM, an important manufacturing town of the Grand Duchy of Baden, on the northern border of the Black Forest, stands on the Eus. at its confluence with the Nagold and Wurm, 55 miles south-south-east of Mannheim, and on a recently-constructed branch of the Mannheim and Bale Railway. It consists of the town proper—surrounded with a wall and ditch—and the suburbs; contains the remains of an ancient castle, formerly the residence of the Markgrafs of Baden-Durlach; several churches, one of which, the *Schlosskirche*, on a height, contains a number of monuments, with marble statues of the princes of Baden; a convent for noble ladies; industrial and other schools; chemical and iron-works; machine-shops, tanneries, and cloth and other factories. The principal articles of manufacture are gold and silver wares and trinkets, the chief markets for which are Germany and America. An important trade is carried on in timber, which is cut in the neighbouring forests, and is floated down to Holland by the Neckar and Rhine. Pop. of town and suburbs, about 9000.

PHÆDRUS, a Latin poet, whose works consist of fables. He was probably a Thracian or Macedonian, carried to Rome as a slave in his childhood, and brought up at the court of Augustus, who emancipated him. Under Tiberius, he was exposed to great danger from the hostility of Sejanus, but lived to see that general's overthrow, and died at an advanced age, probably in the reign of Claudius. Five books of fables, after the manner of Æsop, and called *Fabulæ Æsopice*, have been usually ascribed to him. The faults of the style have led, however, to the suspicion, not merely of alterations at a later date, but of later, and even much later, composition. The dry 'morals' have been supposed to indicate the Middle Ages as the period to which the work should probably be referred; but its authenticity is generally admitted. The first edition was published at Troyes in 1596. The text has subsequently occupied the attention of some of the greatest scholars and critics, from the days of Burmann and Bentley to the present time. A sixth book, containing 32 fables, has recently been discovered and published, of the authenticity of which, however, there are greater doubts than of that of the other books. The best edition is that of J. C. Orelli (Zürich, 1831).

PHÆNOGAMOUS PLANTS. See PHANEROGAMOUS PLANTS.

PHAËTHON (i.e., the shining), in the writings of Homer and Hesiod, a frequent title of Helios the sun-god, and subsequently employed as his name.—P., in Greek mythology, is also the name of a son of

PHALARIS—PHALLUS.

military skill of the west, is deserving of description. The line was 16 deep: a grand-phalanx comprising 16,384 *hoplites*, or heavy-armed soldiers, subdivided as follows: the grand-phalanx was composed of four phalanxes or divisions, each under a general officer, called a *phalangarch*; his command was divided into two brigades or *merarchies* (sometimes called *telarchies*), each of these comprising two regiments, or *chilarchies*, of four battalions or *syntagma* each. A *syntagma* answered accurately to a modern battalion, except that it was smaller. It was a perfect square, with 16 men each way, was commanded by a *syntagmarch* or *xenagos*; and had an adjutant, with one or two other staff-officers who stood behind. Eight files united were under a *taxiarch*, four under a *tetrarch*, corresponding probably to a modern captain, two files were under a *dilochite* or subaltern. A single file of 16 men was called a *lochos*, and the best man was placed at its head; a picked man, the *ouragos*, also marching in the rear. The arms of all these phalanx-men were pikes or spears, 24 feet long, of which 6 feet were behind and 18 feet held in front of the combatant. As each man occupied with his shield three feet, the phalanx, when it advanced, had six tiers of spear-points in front, a wall of steel which no troops could withstand, especially as the bearers of the spears were pressed on by the ten ranks in their rear. By rapid movements the phalanx could change front, form in close column of *syntagma*, and execute other critical manœuvres. —The heavy-armed phalanx was ordinarily flanked by *pelastæ* or light infantry, similarly formed, but only eight deep, while the cavalry were but four deep. The phalanx, as representative of the heavy formation, came in contact with the lighter legion of Rome during the wars of Pyrrhus in Italy. —At the great battle of Heraclea (279 B.C.), the phalanx won the day; but the victory was attributable to other causes as much as to any superiority of formation.

PHALARIS, a tyrant of Agrigentum in Sicily, who flourished about the middle of the 6th c. B.C. According to the prevalent tradition, he was infamous for his cruelty. He maintained his power for 16 years by the aid of foreign hirelings, and, it is said, by putting to death all persons of eminence in his dominions; but at last he fell a victim to popular indignation. He gratified, we are told, his love of cruelty by causing persons to be roasted alive in a brazen bull, which was made for that purpose — the first victim being the maker, Perillus. Cicero calls him the 'most cruel of all tyrants' (*crudelissimus omnium tyrannorum*). But some doubt attaches to this view of his character, partly because many of the crimes laid to his charge are intrinsically improbable, and partly because later traditions represent him as fond of literature and philosophy, and a patron of learned men. Lucian affirms that he was naturally a man of a mild and humane disposition. How far the later view should be allowed to modify the earlier, it is—in the absence of all reliable knowledge—impossible to say. It is under the later aspect that he is shewn to us in the famous but spurious *Epistles of Phalaris*. See BENTLEY.

PHALAROPE (*Phalaropus*), a genus of birds of the family *Lobipedidae* (q. v.); having a rather long, slender, weak, straight bill, resembling that of the sandpipers, which, indeed, they otherwise much resemble, although differing in their aquatic habits; the greater part of their time being passed in swimming on the sea, where they seek molluscs and other small marine animals for their food. The GRAY P. (*P. lobatus*), although formerly so rare a bird in Britain that Pennant says he only knew of two instances of its occurrence in his time, is now

not unfrequently seen in its autumn migration from its northern abode to its southern winter-quarters. It breeds in the Arctic regions both of the old and new world, migrating southward in both on the approach of winter. Its entire length is rather more than eight inches. The tail is short. It is a beautiful bird, and remarkable for the great difference of its summer and winter plumage, the prevailing tint in winter being a delicate gray, whilst in summer

Gray Phalarope (*P. lobatus*).

the upper parts exhibit a fine mixture of black, white, and yellow, and the breast and under parts are reddish chestnut.—The RED-NECKED P. (*P. hyperboreus*, or *Lolipes hyperboreus*, a generic distinction being made by Cuvier and others, on account of the sharper and more slender bill), breeds in some of the northern Scottish islands, although it is more common in more northern regions, and, like the former, is found in all the northern parts of the world. It is rather smaller than the Gray P., and is, like it, very graceful in form and movements, and finely coloured. The phalaropes are very fearless of man, and very easily tamed. Their flesh is oily and unpalatable.

PHALLUS, a representation of the male generative organs, used at certain Dionysian festivals in ancient Greece, as a symbol of the powers of procreation. It was an object of common worship throughout the nature-religion of the East, and was called by manifold names, such as Langa (q. v.), Joni, Pollear, &c. Originally, it had no other meaning than the allegorical one of that mysterious union between the male and female, which throughout nature seems to be the sole condition of the continuation of the existence of animated beings; but at a later period, more particularly when ancient Rome had become the hot-bed of all natural and unnatural vices, its worship became an intolerable nuisance, and was put down by the senate on account of the more than usual immorality to which it gave rise. Its origin has given rise to much speculation, but no certainty has been arrived at by investigators. The Phœnicians traced its introduction into their worship to Adonis, the Egyptians to Osiris, the Phrygians to Attys, the Greeks to Dionysus. The common myth concerning it was the story of some god deprived of his powers of generation—an allusion to the sun, which in autumn loses its fructifying influence. The procession in which it was carried about was called Phallagoga, or Periphallia, and a certain hymn was sung on that occasion, called the Phallikon Melos. The bearers of the phallus, which generally consisted of red leather, and was attached to an enormous pole, were the Phallophoroi. Phalli were on those occasions worn as ornaments round the neck, or attached to the

and to some extent also in religious matters. The P. had no special 'Confession of Faith,' or articles of creed different from the whole body of Jews. The Bible, as interpreted by the traditional Law, was their only code. Obedience to this Law, strictest observance of all religious and moral duties, submission to the Divine will, full confidence in the wisdom and justice of Providence, firm belief in future reward and punishment, chastity, meekness, and forbearance—these were the doctrines inculcated in their schools. They were, in fact, nothing more or less than the educated part of the people, who saw in the rigid adherence to the ancient religion, such as it had developed itself in the course of centuries, the only means of saving and preserving the commonwealth, notwithstanding all its internal and external troubles. Hence, they wished the public affairs, the state and all its political doings, to be directed and measured by the standard of this same Divine Law; without any regard for those aristocratic families who ruled, or at all events greatly influenced the commonwealth. These consisted of the priestly families, the Zadokites (Saducees, q. v.), and of the valiant heroes and sagacious statesmen, who had brought the Syrian wars to a successful issue, and had, by prudent negotiations with other courts, restored the nation to its former greatness, and, on their own part, had acquired wealth and fame, and freer and wider views of life and religion. The latter held the modern doctrine, that religion and state were two totally different things; that God had given man the power of taking his matters into his own hands; and that it was foolish to wait for a supernatural interference, where energy and will were all that was required. Naturally enough, the political difference between the two parties by degrees grew into a religious one, since the Jewish State was one still completely pervaded by the religious element—as indeed it had begun as a theocracy, and could still, to a certain extent, be called by that name. And the more the Sadducees lost their influence—the people siding with the P.—the more the religious gulf must have widened between them; although the divergence between them, as far as our authorities—Josephus, the New Testament, and the Talmud—go, does not seem to have been of a very grave nature. Thus, the P. assumed the dogma of immortality, chiefly with a view to a future reward of good and evil deeds in this world; while the Sadducees, without rejecting—as we are erroneously informed by Josephus—this dogma in the least, yet held that there was nothing in the Scripture to warrant it, and, above all, that there was no need of any future reward; at any rate, that a pious life with a view to this was not meritorious. While the P. held all the traditional ordinances in equal reverence with the Mosaic ones, tracing, in fact, most of the former to Sinai itself, the Sadducees rejected, or rather varied some of these according to the traditions of their own families: these ordinances chiefly relating to priestly and sacrificial observances, certain laws of purity, and some parts of the civil law. It may perhaps even be assumed, with the most recent investigators (chiefly Geiger), that the P. were the representatives of a newer Halacha, dictated by an oppositional and religious and national zeal which carried them far beyond the original boundaries. Certain other legal differences between the two parties, such as the application of the laws of inheritance to daughters, or of the responsibility of the master for his servants, are nothing more than political party-views in a religious mask, which were meant to meet certain special isolated cases only. In general, the P. handled justice in a

much milder manner than their antagonists, who took their stand upon the rigid letter, and would hear of no mercy where a violation of the code was clearly made out. Out of the midst of the P. rose the great doctors and masters of the Law (*Soferim*, Scribes, *Nomodilaskaloi*, teachers of the Law), and to them were intrusted by the later rulers the most important offices.

Until recently, the greatest misconception has prevailed even among scholars respecting this self-sacrificing, patriotic, pious, learned, and national party of progress. That there were among them those who were a disgrace to any party, and, still more, to their strict one, no one knew better than the P. themselves, and in bitterer words than were ever used by Christ and the apostles, the Talmud castigates certain hyperpious members of their own community as the 'plague of Pharisaism.' These hypocrites were characteristically styled *Zebuim* (dyed, painted ones), 'who do evil deeds like Zimri, and require a godly reward like Phinehas.' Seven kinds of P. are enumerated in the Talmud, six of whom were not to be counted as real Pharisees—viz. (1) they who did the will of God for earthly motives; (2) those who made very small steps, or said: Wait for me—I have still some good deed to do; (3) those who knocked their heads against walls, lest they might look at a woman; (4) *ex officio* Saints; (5) those who say: tell me of another duty; (6) those who are pious, because they fear God. The only genuine Pharisee was he 'who did the will of his Father in Heaven, because he loved Him.' Josephus's accounts, distortions in themselves, have, to add to the confusion, been misunderstood (thus, for example, the word which he uses to designate the three parties, never meant 'sect,' as it has invariably been interpreted); and the position of Christ, in relation to the P., can never be understood properly without a full acquaintance with the circumstances of the time, to which there is no other way than a knowledge of that literature (the Talmud and Midrash) which has so long been neglected. Christ found the influence of the P. predominant among the people, although the Sadducees (and the Boethusians) were in reality the ruling classes and allies of the reigning dynasty. He naturally sided with the democratic party of the P. against that of the proud opposite camp. As for the religious tendencies of the latter, the Sadducees (q. v.)—the people had decided that point already practically, by siding with the Pharisees. Once only an allusion is made also to the leaven of Herod = the Sadducees (Mark viii. 15, cf. Matt. xvi. 6). But it was, above all things, necessary to combat the ever-growing tendency to choke up, as it were, all real piety and genuine virtue of heart under external ceremonies and observances, which, unless guarded against, will appear, instead of a mere symbol and memento, the essence of religion itself, and thus become in time a delusion and bondage, and end in that vile hypocrisy, against which the Talmud fights with all its powers of derision, and Christ inveighs in much more vehement terms than is his wont. It was not in themselves that these 'oral laws' were held up to scorn. They were a necessary and natural growth, and acted, in the main, beneficially; as is now fully recognised by scholars of eminence. (For some further remarks on the subject, see TALMUD.)

Pharisaism—from which gradually branched off the wild democratical party of *Zealots* (*Kannaim*), and which for the last time represented political opinions in the revolution of Bar Cochba—has, from the downfall of the sanctuary, and the final destruction of the commonwealth to this day, remained the

posterior diameter, and its narrowest point is at its termination in the œsophagus. Seven foramina or openings communicate with it -viz, the two

and a *mucoous* coat, continuous with the mucous membrane of the mouth and nostrils. The muscular coat requires special notice. It is composed of a *superior, middle, and inferior constrictor* muscle of either side, together with two less important muscles, termed the *stylo-pharyngeal* and *palato-pharyngeal* muscles. When the food, after being sufficiently masticated and mixed with saliva, is thrown, by the action of the tongue, into the P., the latter is drawn upwards and dilated in different directions; the elevator muscles (the stylo-pharyngeal and palato-pharyngeal) then relax, and the P. descends; and as soon as the morsel is fairly within the sphere of action of the constrictor muscles, they successively contract upon it, and gradually pass it onwards to the oesophagus. Independently of its importance in the act of swallowing, the P. exerts an influence on the modulation of the voice, especially in the production of the higher notes.

The P. is not so frequent a seat of disease as many other parts of the intestinal tube. In cases of Diphtheria (q. v.) it is usually the chief seat of the disease. It is liable to ordinary inflammation or *pharyngitis*—an affection characterised by pain, especially in swallowing, without redness in the fauces or change of voice. Little in the way of treatment, except low diet and attention to the bowels, is required; and the inflammation usually terminates in resolution. Sometimes, however, it proceeds to suppuration, and abscesses—dangerous partly from inanition consequent on inability to take food, but chiefly from suffocation due to pressure on the larynx—are formed. These abscesses are more dangerous in the lower than in the upper part of the P., and are more common in young children than in adults. The treatment consists in opening the abscess, which gives immediate relief, but the operation must be conducted with great care, and the incision made as nearly as possible to the medial line, in consequence of the large adjacent blood-vessels.

PHASCOGALE, a genus of marsupial quadrupeds, of which one species, *P. penicillata*, about the size of a rat, gray, with long soft hair, and a long tufted tail, is common in most parts of Australia, lives chiefly in the hollows of decayed trees, and preys on small animals of every kind. It is much disliked by the colonists, to whom it is known as the *Tapoa Tapa*, on account of its depredations in poultry-yards and larders. It is very agile and audacious.

PHASE'OLUS. See KIDNEY-BEAN.

PHASES (Gr. *phasis*, appearance), the different luminous appearances presented by the moon and several of the planets, sometimes the whole, a part, or none, of the luminous surface being seen from the earth. The various phases of the moon, and the reasons of them, are mentioned under the article **MOON**. Mercury and Venus, being inferior planets, present to an observer on the earth exactly similar phases to those of the moon; but the former require, instead of a month, periods of 116 and 584 days respectively to pass through a complete series of phases. The superior planets, to a certain extent, exhibit phases, but the luminous surface, as seen from the earth, only varies from the full illumination seen when they are in conjunction with the earth to a slightly gibbous appearance when they attain their greatest elongation; and their distance from the sun is so great in comparison with that of the earth, as to render the variation in the form of their luminous surface not observable, except in the case of Mars and occasionally of Jupiter. Galileo was the first to observe the phases of Venus, and he considered them as one of the most satisfactory proofs

Fig. 1.—The Pharynx laid open from behind :

1, a section of the base of the skull; 2, 2, the walls of the pharynx drawn to either side; 3, 3, the posterior nares, separated by the vomer; 4, 4, the extremities of the Eustachian tubes; 5, the soft palate; 6, 6, 7, 7, its posterior and anterior pillars; 8, the root of the tongue, 9, the epiglottis overhanging; 10, the opening of the larynx; 11, the posterior part of the larynx; 12, the opening into the oesophagus, whose external surface is seen at 13; 14, the trachea.—(From Wilson.)

posterior nares or nostrils, at the upper and front part of the P.; the two *Eustachian tubes*, opening on the outer surface of the preceding orifices; the *mouth*; the *larynx*; and the *oesophagus*.

The P. is composed of an external muscular coat;

Fig. 2.—External View of the Muscles of Pharynx :

1, the orbicularis oris muscle; 2, the Buccinator muscle; 3, portion of lower jaw, part of which is cut away; 4, pterygomaxillary ligament; 5, the hyoid bone; 6, the thyroid cartilage; 7, the bicoid cartilage; 8, the trachea; 9, the esophagus, with the recurrent laryngeal nerve lying between it and the trachea; 10, the stylo pharyngeus muscle; 11, 12, 13, the superior, middle, and inferior constrictor muscles.

a middle fibrous coat called the *pharyngeal aponeurosis*, thick above where the muscular coat is absent, and gradually thinning as it descends;

of the forests of India and China, and is said not to breed with the Common P. in a truly wild state, but in Britain they readily intermix. It is distinguished by a white ring almost surrounding the neck, and is of smaller size than the Common P., somewhat different in markings, and has a shorter tail.—The **BOHEMIAN P.** is another variety of a silvery-gray colour.—White pheasants are of not very unfrequent occurrence.—Of other species of P. may be mentioned **DIARD'S P.** (*P. versicolor*), a native of Java, in which the prevailing colour is green; and **REEVES'S P.** (*P. Reevesii*), a native of the north of China, in which white is the prevailing colour, and the tail is of extraordinary length, so that a bird not larger than the Common P. measures eight feet in entire length. Of somewhat different type, and more nearly approaching to the common fowl, are the **GOLDEN P.** (*P. pictus*, or *Thaumalia picta*) and the **SILVER P.** (*P.* or *Gallophasix nycthemerus*), both natives of China, and both hardy birds, the introduction of which into British preserves has been attempted with good prospect of success. Both have long been kept in a state of domestication by the Chinese. The Golden P. is one of the most splendid of the tribe. It has a fine crest, and a ruff of orange and black, capable of being erected at pleasure. The tail is very long. The crest and ruff are held in great estimation by anglers for making artificial flies.—**LADY AMHERST'S P.** (*P.* or *Thaumalia Amherstiae*) is a native of China, resembling the Golden P., and with an extremely long tail.—The Silver P. is one of the largest and most powerful of the tribe, and very combative, driving the Common P. from preserves into which it is introduced. The prevailing colour of the upper parts and tail of the male is white, finely pencilled with black, the breast and belly purplish-black.—The name P. is sometimes extended to gallinaceous birds of allied genera.

PHEASANT-SHELL (*Phasianella*), a genus of gasteropodous molluscs of the family *Turbinidae*, of which the shells are much valued for their beauty, and when they were rare in collections, were sometimes sold for extraordinary prices. They are now comparatively cheap and plentiful, being found in great numbers on some parts of the Australian coast.

PHEIDIAS (Lat. *Phidias*), son of Charmides, the greatest sculptor of ancient Greece, born at Athens probably between 500—490 B.C. His first instructor in art was Hegias of Athens; he afterwards studied under a more famous master, Ageladas of Argos. He appears to have first acquired distinction in his profession soon after the battle of Salamis, and indeed his great works were all executed during a period most favourable for the development and encouragement of genius, when Greece was triumphant over external enemies, and her people enjoyed a more perfect liberty than almost at any other period of their history. With the character of the age correspond the works of its poets, particularly of the tragedians Æschylus, Sophocles, and Euripides, and of its sculptors, particularly of Pheidias. Under Cimon's administration the Athenians began the work of restoring their city, which the Persians had destroyed, in more than its former magnificence, and to fill it with noble works of art. P. was accordingly employed in making the colossal brazen statue of Minerva, *Athena Promachos*, which was placed upon the citadel, and was executed probably about 460 B.C. To the government of Cimon succeeded that of Pericles, still more brilliant, and signalled by an extraordinary development of art. Pericles not only gave to P. a commission to execute all the

more splendid statues that were to be erected, but made him general superintendent of all works of art going on in the city. Plutarch tells us that P. had under him architects, statuaries, workers in copper and bronze, stone-cutters, gold and ivory beaters, &c. To P., as director-general of all the skilled artists and artificers of Athens, we owe, among other glorious edifices, the Propylæa and the Parthenon, the sculptured ornaments of which were executed under his direct superintendence, while the statue of the goddess Athens, the materials for which were ivory and gold, was the work of P. himself (circa 438 B.C.). This statue was clothed with a golden robe, which alone was worth 44 talents of gold. The statue is gone for ever, and the Parthenon is now only a magnificent wreck, but we still possess some splendid evidence of the genius of P., in the sculptures of the metopes, and friezes of the temple of Athens. See **ELGIN MARBLES**. Next year P. went to Elis, where he executed a colossal statue of Zeus for the Olympæum at Olympia (q. v.), also of ivory and gold (about 433 B.C.). This was reckoned his masterpiece. On his return to Athens, political passions were running high. There was a strong—at least a violent—party inimical to Pericles, but as they did not dare to attack the great statesman, they assailed him through his friends P., Anaxagoras, Aspasia, &c. P. was accused of having appropriated to himself some portion of the gold destined for the robe of Athena. This accusation he repelled by taking off the robe and weighing it. He was then accused of impiety, for having introduced his own likeness and that of Pericles on the shield of the goddess. On this most frivolous and contemptible pretext he was thrown into prison, and died there, but whether of sickness or poison is uncertain. His death took place about 432 B.C. The works executed by, or ascribed to P., were numerous, but we have mentioned the most celebrated. Their prevailing characteristic appears to have been an ideal sublimity, and even the imperfect relics that we possess are the most noble specimens of sculpture in the world.

PHENOMENON (Gr. appearance), the name given in philosophy to an object or fact as it is perceived by us, as distinguished from what it is in itself. In the philosophy of Kant, that, whatever it may be, which is behind the phenomenon, and causes it, is called the *noumenon*, as being merely assumed or thought of in the mind. See **METAPHYSICS**, **PERCEPTION**.

PHENYL, AND THE PHENYLIC GROUP. Phenyl (C_6H_5) is an organic radical, which has not yet been isolated. Its most important compounds are: (1.) Carbolic or Phenic Acid ($HO.C_6H_4.O$), known also as Phenol, Hydrated Oxide of Phenyl, and Phenyl-Alcohol. See **CARBOLIC ACID**. (2.) Hydride of Phenyl (C_6H_6), known also as Benzole, Benzine, and Phenæ. See **BENZOLE**. (3.) Phenylamine or Phenylia ($C_6H_5.H_2N$, or $C_6H_4.N$), better known under the name of Aniline, one of the most important of the artificially formed bases.

Aniline derives its name from *anil*, an obsolete name for indigo, which is one of the sources from which it is most readily procured. It exists amongst the products of the distillation of coal, and probably other organic compounds, but is always obtained by the manufacturing chemist either from indigo or from nitro-benzole. Dr Hofmann, to whom we are mainly indebted for our knowledge of the chemistry of this substance, gives the following directions for obtaining it from indigo: 'Powdered indigo boiled with a highly-concentrated solution of hydrate of potassa, dissolves with evolution of hydrogen gas

ruin, in all Greece; but owing to its sequestered position at the head of a lonely and rocky glen among the Arcadian hills, it long remained unknown in modern times, except to the shepherds of the district; and to the same circumstance it probably owes, in part, its preservation. Chandler first visited and described it in 1765; he was followed by Gell, Dodwell, and others; and in 1812 it was very carefully examined by a body of artists and scholars, the results of whose investigations are given in Stackelberg's *Der Apollo-tempel zu Bassæ in Arkadien* (Rome, 1826). The temple is built of a hard yellowish-brown limestone, stands north and south, was originally about 125 feet long and 48 broad, and had 15 columns on either side, and 6 on either front, in all 42, of which 36 still remain.

PHILADELPHIA, the chief city and seaport of Pennsylvania, U.S., and the second city in population and importance in America, is situated on the west bank of the Delaware River, at the mouth of the Schuylkill, on a plain 2 to 4 miles wide between the two rivers; lat. 39° 56' 59" N., long. 75° 9' 54" W.; 136 miles north-east of Washington, 87 miles south-west of New York. It is 5 miles long by 3½ wide, having 12 square miles, laid out by its founder, William Penn, in streets crossing each other at right angles. The city is neatly but plainly built of red bricks and marble, with 7 squares laid out as parks. The picturesque eminence of Fairmount, with its reservoirs of water raised from the Schuylkill, and the Laurel Hill and other ornamental cemeteries, are favourite public resorts. Among the finest edifices are the Custom-House (formerly United States Bank), Mint, and the buildings of the Girard College, all built of white marble, the latter, in the Corinthian style, having cost, with the surrounding buildings, 2,000,000 dollars. There are 4 or 5 theatres, and an 'Academy of Music' capable of seating about 8500 persons, some 350 churches, about 60 of which are Episcopal, 70 Presbyterian, and 80 Roman Catholic, among which is a magnificent Cathedral, just completed; numerous and magnificent hotels, markets, and public institutions. The most noted building is Independence Hall, occupied in the revolution of 1776 by the Continental Congress, in which was voted and signed the Declaration of Independence. The Philadelphia Library, founded by Benjamin Franklin, contains 80,000 volumes. There are also an Academy of Fine Arts, an Academy of Natural Sciences, Girard College, the University of Pennsylvania, and several flourishing medical colleges. The public schools of Philadelphia comprise 2 high schools, 60 grammar-schools, and more than 300 schools of lower grades. The Girard College, founded by Stephen Girard, a Philadelphia merchant, supports and educates 600 orphans. Next to New York, P. is the largest publishing emporium in the country, issuing, besides books, about a dozen daily papers, 40 weekly papers, and 50 periodicals. Among the charitable institutions, for which the city is noted, are 22 hospitals and dispensaries, 14 asylums, 4 lying-in charities, and 14 for the relief of the poor; a city almshouse, with 3000 inmates; house of refuge, &c. There are 15 military hospitals, with beds for over 13,000 patients. The Eastern State Penitentiary is a model institution on the system of solitary confinement. The city, divided into 26 wards, is governed by a mayor, a select council of 26, and common council of 44 members. The city revenue is 2,724,709 dollars; its debt, 21,000,000 dollars. The United States mint, established 1791, had, up to 1862, coined 404,928,876 dollars in gold and 97,725,589 dollars

in silver. There are several fine brick market-buildings; some 25 banks of issue; 7 or 8 savings banks; board of trade; merchants' exchange; corn exchange; an excellent harbour; imports, direct and by New York, of 45,000,000 dollars per annum; a large coal trade; railways which in 1860 conveyed goods to the interior to the value of 140,000,000 dollars; manufactures of iron, machinery, cotton, woollen, clothing, chemicals, boots and shoes, furniture, &c., amounting to 175,000,000 dollars a year. P. was founded in 1682 by William Penn, on 'a spot that seemed to have been appointed for a town,' and of which he wrote, 'Of all places in the world, I remember not one better seated.' Its early settlers were mostly of the Society of Friends. In 1684 it had 2500 inhabitants. It grew rapidly by large immigrations from Germany and the North of Ireland. In 1729 was established the *Pennsylvania Gazette*, afterwards edited by Franklin. The first colonial congress met here in 1774; in 1777 the town was occupied by the British forces under General Lord Howe, when the city contained 21,767 inhabitants. It was the seat of the United States bank, the capital till 1800, and the first city in America, until surpassed by New York. Pop. (1860) 565,531.

PHILÆ, the name of a celebrated island lying in the midst of the Nile, south of Syene, beyond the frontier of Egypt, in 24° 1' 28" N. lat. It was called by the Egyptians Menlak, the place of the Cataract; or *Menub*, the Abaton or Sanctuary; and by the Copts, Pilak or 'Cataracts.' It is a small granite rock, about 1000 feet long, and 20 feet broad, on which is placed a suite of buildings, not of the most remote antiquity, but distinguished for great architectural beauty. The oldest of these, consisting of a hypæthral or roofless hall, was built in the reign of Nectanebus I., 377—357 B.C. A second mention of the same monarch occurs on the first pylon, where a door, constructed in his reign, has been incorporated into the construction by a later Ptolemy. Both these are dedicated to the goddess Isis, who in P. was venerated as Atar or the Egyptian Venus. The principal remains consist of the great temple of Isis, erected by Ptolemy II. or Philadelphus, and continued by his successors, especially by Ptolemy III., Euergetes, 247—222 B.C.

The temple consists of a shrine or *sekos*, a pronaos, an open portico, and two pylons or gateways. Remains of the propylæa were constructed by Ptolemy VII., or Philometer, and Lathyrus; but the first was added to by Ptolemy IX., or Euergetes II., 145—141 B.C. On the second pylon, the monarch is represented slaying the hostile nations. The colonnade was principally erected by Tiberius. The charming little temple, the Mastabat el Pharaoun, or Pharaoh's Bed of the Arabs, was made in the reign of Trajan, 100 A.D. The temples are particularly important as containing the principal representations of the story of Osiris, his birth, bringing up, death, and embalmment by Isis. Commenced in the reign of Nectanebus I., and continued by the Ptolemies and Romans, the worship of Isis lingered here till 435 A.D., or sixty years later than the edict of Theodosius. After the subjection of the Blemmyes to the Nubian Christians, the temple was converted into a church, and the paintings daubed with mud; and in 577 A.D., the bishop Theodorus changed the pronaos of the temple of Isis into the church of St. Stephen, and a Coptic church, at a later period, was built out of the ruins. The whole area of the ancient temple was about 435 feet long by 135 broad, in the centre of the dromos. At the present day the island is deserted. It is a favourite resort of travellers

PHILIP^{III}, soon acquired great wealth and fame, and ultimately became celebrated in profane as well as in sacred history. The surrounding district was rich in gold-mines, which proved a source of great revenue to P. (about, say, £250,000 annually), and supplied him plentifully with the means of paying his armies, of bribing traitorous Greeks, and of opening the gates of many cities, the sieges of which might otherwise have cost the blood of thousands. After a few years of comparative leisure, he turned his ambitious views southward; and capturing Methone (at the siege of which he lost an eye), he advanced into Thessaly, and ultimately to the Strait of Thermopylae, which, however, he did not attempt to force, as it was strongly guarded by the Athenians. He therefore returned into Macedonia, and directed his arms against the Thracians, waiting for a more fitting occasion to carry out his darling project. Such an opportunity was not long wanting. After capturing all the towns of Chalcidice—the last of which was the important city of Olynthus—he made peace with the Thracians, and next year with the Athenians, who had been at war with him in defence of their allies the Olynthians. It was this siege of Olynthus by P. which called forth these Olynthiac orations of Demosthenes, which are still admired as efforts of oratorical genius hitherto unequalled in any country. P. was now requested by the Thebans to interfere in the war ('the Sacred War') which was raging between them and the Phocians. He marched into Phocis, destroyed its cities, and sent as colonists to Thrace many of the inhabitants (346 B.C.). The place which the Phocians had occupied in the Amphictyonic Council was transferred to P., and he was appointed, jointly with the Thebans and Thessalians, as president of the Pythian games. His next step was to secure a footing in the Peloponnese, by espousing the cause of the Argives, Messenians, and others, against the Spartans. In 339 B.C. the Amphictyonic Council declared war against the Locrians of Amphissa; and, in the following year, appointed P. commander-in-chief of their forces. The Athenians were alarmed at his approach into Greece in this capacity, and formed a league with the Thebans against him; but their united army was utterly defeated at the battle of Charonea (338 B.C.), and all Greece was at the feet of the conqueror. He was now in a position to enter on the great dream of his later years—viz., to invade the Persian empire, and revenge the injuries of Greece. Deputies from the different states of Greece assembled in congress at Corinth; and after resolving to make war on the Persian king, chose P. as leader of their armies. Preparations were in progress for this great expedition when he was suddenly cut off by the hand of the assassin Pausanias, at a festival celebrating the marriage of his daughter with Alexander of Epirus (336 B.C.). A private grudge at P., for neglect to punish an insult offered to Pausanias by Attalus, was said to be the motive which inspired the murderer, though suspicion is not wanting that the deed was done at the instigation of Alexander and his mother Olympias, who had retired from the court in disgust at P.'s marriage, the year previous, with Cleopatra, daughter of Attalus, one of his generals. P. was a man given to self-indulgence and sensuality; he was faithless in the observance of treaty obligations, and unscrupulous as to the means by which he gained his ends; but he had to deal with factious and faithless opponents, which may help to explain, if it does not justify his policy; while his clemency as a victor has won the admiration even of the virtuous Cicero, who pronounces him 'always great.' Of his force and energy of

character, his acuteness, fertility of invention, and eloquence, it is impossible to speak too highly. He was at the same time a lover of learning, and a liberal patron of learned men. He reigned from 359 to 336 B.C.

PHILIP III., OF MACEDON. On the death of Alexander the Great at Babylon in 323 B.C. the army elected as king, under the name of Philip III., Arrhidaeus, son of Philip and Philina of Larissa, one of his many wives. He was a youth of weak understanding, and was totally unfit for the duties of government. His wife Eurydice (daughter of Amyntas, son of Perdiccas III.), whom he married in 322 B.C., endeavoured, on their return to Macedonia, to oppose the measures of Polyperchon and Olympias in support of the young Alexander, posthumous son of Alexander the Great and Roxana. But her army was defeated; she herself was taken prisoner; and, along with her husband, was put to death in 317 B.C.

PHILIP II., KING OF SPAIN, the only son of the Emperor Charles V. (q.v.) and Isabella of Portugal, was born at Valladolid, 21st May 1527. He was brought up in Spain, and carefully educated under the superintendence of able tutors, by whose instructions he greatly profited, becoming an accomplished linguist and mathematician, and a connoisseur in architecture and the fine arts. But all attempts to indoctrinate him with the chivalric ideas of the time were utterly futile. From his very childhood he was distrustful and reserved; he invariably spoke with slowness and an air of deep reflection which was too marked to be wholly real, and exhibited in his manners a *sang-froid* which even in his early years was rarely disturbed by ebullitions of passion. While still very young he was intrusted, under the direction of a council, with the government of Spain, and in 1543 he espoused Mary of Portugal, who died three years after. In 1548 he went to join his father at Brussels, and there adopted the multitudinous equipage and minute and pompous etiquette of the late Burgundian court, which from this time he retained. While at Brussels, P. was presented to his future subjects, and was at the same time fully initiated into his father's policy, the two chief items of which were the maintenance and extension of absolute rule throughout his dominions, and the support and propagation of the Catholic religion. In 1554 he married Mary Tudor, Queen of England, and to gain the support of that country to his political projects, and at the same time restore it to the Roman Catholic pale, he laid aside his ordinarily cold and haughty demeanour, and laboured to ingratiate himself with his wife's subjects, taking the utmost care to avoid exciting the national jealousy of foreign influence. But his plans were discovered and frustrated, and this disappointment, combined with the annoyance to which he was subjected by the jealousy of his wife, prompted him to leave England (which he did for ever), and return to Brussels (September 1555). In the following month he became, by the abdication of his father, the most powerful potentate of Europe, having under his sway, Spain, the Two Sicilies, the Milanese, the Low Countries, Franche Comté, Mexico, and Peru; his European territories being more fertile, and their inhabitants more wealthy and prosperous, than any others on the continent, while his army was the best disciplined, and headed by the greatest generals of the age. The treasury alone was deficient, having been drained by the enormous expenditure of his father's wars. P. was eager to begin the crusade in favour of Catholicism, but he was compelled to postpone

Spanish rule in Sicily and Sardinia, brought down upon Spain the wrath of the Quadruple Alliance (France, England, Holland, and Austria), and war was only averted by his being dismissed; but his dismissal was really produced by his neglecting to further the queen's pet scheme of providing sovereignties in Italy for her sons, who seemed to have little chance of obtaining the throne of Spain. The strong bond of union which had hitherto subsisted between Spain and France was broken, in 1725, by the refusal of the regent of the latter country to fulfil certain matrimonial agreements; but four years afterwards the two countries joined with England and Holland against the emperor, and in 1731 P. took measures to recover the old Spanish possessions in Italy. The war which followed at last satisfied the queen by giving the kingdom of the Two Sicilies to her son Charles (1736), but P., in attempting to obtain still greater advantages over Austria, was led into a war of which he was not destined to see the result. He died at Madrid, July 9, 1746.

PHILIPPE II., better known as **PHILIPPE AUGUSTE**, king of France, was the son of Louis VII. and Alix of Champagne, and was born in August 1165. He was crowned, in 1179, during the life of his father, succeeded him in 1180, and proved one of the greatest monarchs of the Capetian dynasty. His marriage with Isabella of Hainault, a descendant of the Carolingians, established more completely the right of his family to the throne of France. He first made war upon the Count of Flanders, to obtain the districts of Vermandois, Valois, Amienois, and Artois, which belonged to his wife, and, after various fortune, obtained Amienois and part of Vermandois at once, and the rest after the count's death in 1185. By the advice of St Bernard (q. v.) he rigorously punished heretics, despoiled the Jews, absolving their debtors of all obligations, excepting one-fifth, which he transferred to himself; put down with vigour the numerous bands of brigands and priest-haters who devastated the country and burned the churches and monasteries, compelling their chief leader, the Duke of Burgundy, to submit (1186) to his authority—acts which gave him great popularity among his subjects. He sustained the sons of Henry II. of England in their rebellions against their father, and conquered, in conjunction with Richard Cœur-de-Lion, many of the English possessions in France. After the accession (1282) of Richard to the throne, P. and he set out together on the third crusade; but quarrelled while wintering in Sicily, and this dissension continuing, P., after a sojourn of 3½ months in Syria, set out (31st July 1190) on his return to France, after taking a solemn oath to respect the integrity of Richard's dominions; but no sooner had he returned than he entered into an arrangement for the partition of Richard's territories in France with his unworthy brother John. Some acquisitions were made, but Richard's sudden return upset the calculations of the conspirators, and a war immediately commenced between the two monarchs, in which P. had at one and the same time to defend his territories from the English, and the Counts of Champagne, Boulogne, Bretagne, and Hainault, who attacked them on all sides. In order to obtain money, he was obliged to rescind his edicts against the Jews; but the mediation of Pope Innocent put an end (13th January 1199) to a war which was productive of no other result than the exhaustion of the strength of the combatants. Richard of England died within two months after; but war almost immediately recommenced with England, regarding the respective claims of King John of England and his nephew

Arthur of Bretagne to the French heritage of Richard Cœur-de-Lion, which consisted chiefly of Anjou, Maine, and Touraine. Arthur had applied for aid to P., and the French king immediately responded by causing the young duke to be recognised in the above-mentioned provinces; but a quarrel in which he became involved with the pope on account of his having divorced his second wife, Ingelburga of Denmark, to marry Agnes of Meran, a Tyrol-princess, compelled him to leave the English in possession for a little time longer. The defeat, capture, and subsequent murder of Arthur, however, again brought him into the field. The English provinces in France were attacked by the combined French and Bretons; Normandy and Poitou, with the three disputed provinces, were annexed to France; and the English dynasty in Bretagne dispossessed by a French one (26th October 1206). During 1211—1214, P. was engaged in a war with King John of England and the Emperor Otto of Germany, who had leagued themselves against him, in which he was on the whole successful. During the rest of his reign, P. was occupied in consolidating his new possessions, and took no part either in the war with the Albigenes or that in England, though his son Louis (q. v.) went to the latter with an army. P. succeeded in establishing the unity of his dominions, and in emancipating the royal authority from the trammels of the papacy and clergy, and vindicated his sovereign authority over the latter as his subjects, irrespective of the pope. His measures, without alienating the great feudal lords, tended firmly to establish his authority over them, and to emancipate the larger towns from their sway. To increase the unity of the kingdom, and strengthen the central power, he established at Paris a chamber of twelve peers, six lay and six ecclesiastical, who almost always supported his plans, even against the court of Rome. Finally, he largely improved and embellished Paris, built many churches and other institutions, and encouraged commercial associations; he also fortified many of the chief towns, including the capital. He died at Mantes, July 14, 1223.

PHILIPPE IV., surnamed *Le Bel* or 'Fair,' king of France, the son of Philippe III., king of France, and Isabella of Aragon, was born at Fontainebleau in 1268, and succeeded his father in 1285. By his marriage with Queen Joanna of Navarre, he obtained Navarre, Champagne, and Brie. For several years he carried on a struggle with the Count of Flanders to obtain possession of that country, and also seized Guienne from the English; but was, in the end, obliged to restore Guienne and Flanders beyond the Lys. The great events of P.'s reign were his war with the papacy and the extermination of the Knights Templars; the former had its origin in the attempt of the king to tax the clergy as well as the laity for the heavy expenses of his numerous wars. Boniface forbade the clergy to submit to taxation, while P., on his side, ordered that neither money nor valuables were to be exported, thus cutting off a main supply of papal revenue; and on the pope's legate insolently reprimanding him, he threw him into prison. P. now called an assembly of states, in which deputies of towns appeared—though not for the first time—and obtained assurance of their support, even in case of excommunication and interdict. Boniface, in turn, assembled a council at Rome (1302), which supported his view, and the celebrated bull, *Unam Sanctam* (q. v.) was issued. P. caused the bull to be publicly burned, and with the consent of the states-general confiscated the property of those prelates who had sided with the pope. Boniface now excommunicated him,

status-general of France by the treaty of Troyes, but the dauphin declined to resign his rights, and took to arms; he was, however, defeated at Crevant (1423) and Verneuil (1424), and driven beyond the Loire. Some disputes with the English prompted P. to conclude a treaty with the king of France in 1429. However, the English, by ceding to P. the province of Champagne, and paying him a large sum of money, restored him to their side. At this time, by becoming heir to Brabant, Holland, Zealand, and the rest of the Low Countries, he was at the head of the most flourishing and powerful realm in Western Europe; but though much more powerful than his superior, the king of France, he preferred to continue in nominal subjection. Smarting under some fresh insults of the English viceroy, and being strongly urged by the pope, he made a final peace (1435) with Charles, who gladly accepted it even on the hard conditions which P. prescribed. The English, in revenge, committed great havoc among the merchant navies of Flanders, which irritated P. to such an extent that he declared war against them, and, in conjunction with the king of France, gradually expelled them from their French possessions. The imposition of taxes, which were necessarily heavy, excited a rebellion, headed, as usual, by the citizens of Ghent, but the duke inflicted upon them a terrible defeat (July 1454), though he wept over a victory bought with the blood of 20,000 of his subjects. The latter part of his reign was filled with trouble caused by the quarrels between Charles VII. and his son, the Dauphin Louis (afterwards Louis XI.), who had fled from his father's court, and sought shelter from P., although, after ascending the throne, far from shewing gratitude, he tried, in the most dishonourable manner, to injure his benefactor. P. died at Bruges, July 15, 1467, deeply lamented by his subjects. Under him, Burgundy was the most wealthy, prosperous, and tranquil state in Europe; its ruler was the most feared and admired sovereign of his time, and his court far surpassed in brilliancy those of his contemporaries. Knights and nobles from all parts of Europe flocked to his jousts and tournaments.

PHILIPPEVILLE, a thriving town and seaport of Algeria, in the province of Constantine, and forty miles north-north-east of the city of that name, on the Gulf of Stora, between Cape Boujaroun and Cape de Fer. It was laid out in 1838 by Marshal Valée, on the ruins of the ancient Russicada, and is one of the prettiest towns in Algeria, and thoroughly French in its character. It is an important entrepôt of the commerce of the east of Algeria, and the country in the vicinity is picturesque and fertile, producing grain, tobacco, cotton, flax, and fruits. It contains numerous public offices, a large hospital and dispensary, Catholic and Protestant churches, public library and museum, theatre, &c. In the vicinity are quarries of the famous Filfila marble. A harbour is at present (1864) in course of construction, and a pier and dock, which afford shelter to small merchant ships in bad weather, have already been completed. There are here several establishments for curing fish, and trade is carried on in grain and in fabrics of native manufacture. P. will be the chief station of the railway for the province of Constantine. Pop. (1864) 12,191.

PHILI'PPI, a city of Macedonia. It was named after Philip II. of Macedon, who conquered it from Thrace (up to which time it had been called Crenides, or the 'Place of Fountains'), and enlarged it because of the gold-mines in its neighbourhood. Philip worked the mines so well, that he got from them 1000 talents a year. It is famous on account

of the two battles fought in 42 B.C. between Antony and Octavianus on the one side, and the republicans under Brutus and Cassius on the other. The first engagement was undecided; in the second, 20 days after, the republic finally perished. The apostle Paul founded a Christian church here in 53 A.D., to which one of his epistles is addressed. The ruins of the city still bear the name of Philippi, or Feliba.

PHILI'PPIANS, EPISTLE TO THE, one of the latest of the Pauline epistles. It was transmitted from Rome probably about the year 63 A.D., through Epaphroditus, apparently a pastor of the Philippian church, who had been sent to minister to the necessities of the apostle. The Philippian church was looked upon with peculiar tenderness and affection by Paul. It was the first fruits of his evangelisation in Europe; its members were singularly kind towards him; again and again, when he was labouring in other cities, such as Thessalonica and Corinth, they sent him contributions that he might not be burdensome to his new converts, and now they had sent one of the brethren all the way to Rome with presents for him, knowing that he was in bonds, and suspecting—what was in fact the case—that he might be in sore straits for his daily bread. His letter to them is deeply affecting. It contains not so much of doctrinal matter, as of a warm outpouring of his personal feelings towards his friends at Philippi. The historical evidence in favour of the authenticity of the Epistle is so strong, that it could hardly give way to any internal criticism; and the objections of this kind, urged by Baur, Schwegler, and others of the Tübingen school, who regard it as a Gnostic composition of the 2d c., are regarded as preposterous even by many Biblical scholars who do not profess to be orthodox.

PHILI'PPICS, originally the three orations of Demosthenes against Philip of Macedon. The name was afterwards applied to Cicero's orations against the ambitious and dangerous designs of Mark Antony. It is now commonly employed to designate any severe and violent invective, whether oral or written.

PHILIPPINE ISLANDS, lie to the north of Borneo and Celebes, in 5° 30'—19° 42' N. Lat., and 117° 14'—126° 4' E. long. They are more than 1200 in number, with an area of about 150,000 square miles. Pop. over 5,000,000, three-fourths of whom are subject to Spain, the remainder governed, according to their own laws and customs, by independent native princes.

Luzon, in the north, has an area of 51,300 square miles, and Mindanao, or Magindanao, in the south, fully 25,000. The islands lying between Luzon and Mindanao are called the Bissayas, the largest of which are—Samar, area 13,020 square miles; Mindoro, 12,600; Panay, 11,340; Leyte, 10,080; Negros, 6300; Masbate, 4200; and Zebu, 2352. There are upwards of a thousand lesser islands of which little is known. To the south-west of the Bissayas lies the long, narrow island of Paragosa or Palawan, formed of a mountain-chain with low coast-lines, cut with numerous streams, and exceedingly fertile. The forests abound in ebony, log-wood, gum-trees, and bamboos. Area, 8820 square miles. To the north of Luzon lie the Batanes, Bashee, and Babuyan Islands, the two first groups having about 8000 inhabitants, the last unpeopled.

The Sooloo Islands form a long chain from Mindanao to Borneo, having the same mountainous and volcanic structure as the P. I., and all are probably fragments of a submerged continent. Many active volcanoes are scattered through the islands; Mayon, in Luzon, and Buhayan, in Mindanao, often

watches, jewellery, &c., are imported. British and American merchants enjoy the largest share of the business, the imports to Great Britain being upwards of £1,500,000 sterling yearly, and the exports thither nearly of the same value. There are seven British houses established at Manila, and one at Iloilo in the populous and productive island of Panay, which is the centre of an increasing trade. The total exports and imports of the P. I. have a value of about £6,000,000 yearly.

The Sooloo Islands have a population of 150,000; are governed by a sultan, whose capital is Sung, in 66° 1' N. lat., and 120° 55' 51" E. long., who also rules over the greatest part of Pagarao, the northern corner only being subject to Spain.

Luzon has a population of 2,500,000, one-fifth part being independent; the Bissayas islands, 2,000,000, of whom three-fourths are under Spanish rule. The population of Pasay amounts to 750,000, and that of Zebu to 150,000. Of the numbers in Mindanao nothing is known; the districts of Zamboanga, Misamis, and Caragan, with 100,000 inhabitants, being all that is subject to Spain. The greater part of the island is under the sultan of Mindanao, resident at Selanga, in 7° 9' N. lat. and 124° 38' E. long., who, with his feudatory chiefs, can bring together an army of 100,000 men. He is on friendly terms with the Spaniards. Besides Manila, there are very many large and important cities, especially in Luzon, Panay, and Zebu. The great centres of trade are Manila in Luzon, and Iloilo in Panay.

The P. I. were discovered in 1521 by Magellan, who, after visiting Mindanao, sailed to Zebu, where, taking part with the king in a war, he was wounded, and died at Mactan, 26th April 1521. Some years later the Spanish court sent an expedition under Villabos, who named the islands in honour of the Prince of Asturias, afterwards Philip II. For some time the chief Spanish settlement was on Zebu; but in 1581 Manila was built, and has since continued to be the seat of government.

PHILIPPINS, a Russian sect, so called from the founder, Philip Pustoswiät, under whose leadership they emigrated from Russia in the end of the 17th c., are a branch of the RASKOLNIKS (q. v.). They call themselves Starowerski, or 'Old Faith Men,' because they cling with the utmost tenacity to the old service-books, the old version of the Bible, and the old hymn and prayer-books of the Russo-Greek Church, in the exact form in which these books stood before the revision which they underwent at the hands of the patriarch Nekon in the middle of the 17th century. There are two classes of the Raskolniks—one which recognises popes (or priests); the other, which admits no priest or other clerical functionary. The P. are of the latter class; and they not only themselves refuse all priestly ministrations, but they regard all such ministrations—baptism, marriage, sacraments—as invalid; and they rebaptise all who join their sect from other Russian communities. All their own ministerial offices are discharged by the Starik, or parish elder, who for the time takes the title of pope, and is required to observe celibacy. Among the P. the spirit of fanaticism at times has run to the wildest excesses. They refuse oaths, and decline to enter military service; and having, on account of this, and many other incompatibilities of the system with the Russian practice, encountered much persecution, they resolved to emigrate. Accordingly, in 1700, under the leadership of Philip Pustoswiät, they settled partly in Polish Lithuania, partly afterwards in East Prussia, where they still have several small settlements with churches of their own rite. They are reported to be a peaceable and orderly race. Their principal pursuit is agriculture; and their

thrifty and industrious habits have secured for them the goodwill of the proprietors, as well as of the government.

PHILIPS, AMBROSE, was born in Shropshire in 1675. He studied at St John's College, Cambridge, and took his degree of M.A. in 1700. In 1709 his Pastorals appeared, along with those of Pope, in *Tonson's Miscellany*; and the same year, having gone on a diplomatic mission to Copenhagen, he addressed from thence a 'Poetical Letter' to the Earl of Dorset, which was published, with a warm eulogium from Steele, in the *Tatler*. In 1712, he brought on the stage *The Distressed Mother*, a tragedy adapted from Racine's *Andromaque*, which had great success. He subsequently wrote two other tragedies, but they proved failures. Some translations from Sappho, which appeared in the *Spectator*, added greatly to P.'s reputation, but Addison is believed to have assisted in these classic fragments. Some exaggerated praise of P. having appeared in the *Guardian*, Pope ridiculed his Pastorals in a piece of exquisite irony, which led to a bitter feud between the poets. P. even threatened personal chastisement, and hung up a rod in Button's Coffee-house, but no encounter took place. One of the names fastened upon P. was that of 'Nabby Pamby,' arising from a peculiar style of verse adopted by him in complimentary effusions, consisting of short lines and a sort of infantine simplicity of diction, yet not destitute of grace or melody. The accession of the House of Hanover proved favourable to the poet; he was appointed paymaster, and afterwards a commissioner of the lottery; and going to Ireland as secretary to Archbishop Boulter, he became secretary to the Lord Chancellor, M.P. for Armagh, and registrar of the Prerogative Court. He died in 1749. P. is somewhat conspicuous in literary history from the friendship of Addison and the enmity of Pope; but his poetry, wanting energy and passion, has fallen out of view.

PHILIPSTOWN, a market and post town (formerly the assize town) of King's County, province of Leinster, Ireland, 47 miles south-west from Dublin. Its charter dates from 1567; and in the reign of James II. it obtained the privilege of sending two members to parliament. This privilege was withdrawn at the Union. It is at present, and has long been a place of hardly any trade and entirely without manufacture, and the town has fallen still more into decay since the withdrawal of the assizes (1838) to the neighbouring and more flourishing town of Tullamore. Pop. in 1861, 918, of whom 830 were Catholics and 88 Protestants.

PHILISTINES (*LXX.*, *Allophuloi*, Strangers). a word either derived from a root *phalasa* (Eth.), to emigrate, wander about, or identified with *Pelassi* (q. v.), or compared by others with *Shuf-la* (Heb.), lowlanders; designates a certain population mentioned in the Bible as being in frequent contact with the Jews, and who lived on the coast of the Mediterranean, to the south-west of Judea, from Ekron towards the Egyptian frontier, bordering principally on the tribes of Dan, Simeon, and Judah. Our information about the origin of the P. is extremely obscure and contradictory. The genealogical table in Genesis (x. 14) counts them among the Egyptian colonies (the 'Casluhim, out of whom came Philistim'); according to Amos ix. 7, Jeremiah xlvii. 4, and Deuteronomy ii. 23, they came from Caphtor. But supposing that the Casluhim were some separate tribe, and yet Caphtorian colonists, the question still remains, whether Caphtor can be identified with Cappadocia in Asia Minor, as the early versions (*LXX.*, *Targ.*, *Pesh. Vulg.*)

Academy, and the following year exhibited a most powerful picture of 'Spanish Contrabandistas,' which was purchased by the late Prince Consort, of whom he also painted a portrait the same year for the town-hall of his native city. In 1859, he received the full honour of Royal Academician. His work for exhibition in 1860 was certainly the most difficult he had yet tried, and his success was proportionably great. 'The Marriage of the Princess Royal' was pronounced by both his fellow-artists and the public as a decided success. His next portrait subject (exhibited 1863) was, if possible, a still more difficult task, being the 'House of Commons,' 1860, containing upwards of thirty portraits of the leading members of both sides of the House; in it he was equally successful. However much he excels in portraiture, his heart is more in his Spanish subjects, of which he is understood to have in progress more works (the fruits of his last two visits to Spain) than he can finish in several years.

The characteristics of Mr P.'s style are rich powerful colour, broad light and shade, strong bold outline, and great variety and truthfulness of texture; there is no living artist who has more power over his brush, or whose example has produced a greater effect on the colorists of the present British school.

PHILO JUDÆUS, the *Philosopher* (there being another Jewish Greek writer of this name), was born at Alexandria, about the time of the birth of Christ. Belonging to one of the most wealthy and aristocratic families—his brother was the Alabarch Alexander—he received the most liberal education; and, impelled by a rare zeal for learning, he, at a very early age, had passed the ordinary course of Greek studies which were deemed necessary for one of his station. Although every one of the different free sciences and arts included in the *Encyclica*, he says, attracted him like so many beautiful slaves, he yet aimed higher, to embrace the mistress of them all—Philosophy. Metaphysical investigation was the only thing which, according to his own confession, could give him anything like satisfaction or pleasure. The extraordinary brilliancy of his style, which, by his contemporaries, was likened to that of Plato—his rare power of thought and imagination, and an erudition which displayed the most astonishing familiarity with all the works of the classical Greek poets and philosophers, while at the same time it made him an adept in the fields of history, geography, mathematics, astronomy, physiology, natural history, music, &c.—could not but be of vast influence both upon his co-religionists and those beyond the pale of his ancestral creed. He had completely mastered the literature of his nation; but, strange to say, he chiefly knew it, as far as it was Hebrew, from translations. Thus, the Bible was only familiar to him through the Septuagint version, with all its shortcomings. When about 40 years of age, he went to Rome as the advocate of his Alexandrian brethren, who had refused to worship Caligula in obedience to the imperial edict. He has left an account of this embassy, into the result of which we need not enter here. Of his life we know little except what is recorded above, and that he once went to Jerusalem. His second mission to Rome, to the Emperor Claudius, on which occasion he is said to have made the acquaintance of the Apostle Peter, as reported by Eusebius, is doubtful.

The religious and philosophical system of P., however, which is really the thing of most consequence, is most minutely known, and is deserving of the profoundest study, on account of the vast

influence which it has exercised both on the Jewish and Christian world. To understand his system aright, it will be necessary to remember the strange mental atmosphere of his days, which we have endeavoured briefly to sketch in our introduction to Gnostics (q. v.). The Alexandrines had endeavoured to make Judaism palatable to the refined Greeks, by proving it to be identical with the grandest conceptions of their philosophers and poets, and had quite allegorised away its distinctive characteristics. P. was the first man who, although himself to a great extent imbued with allegorising tendencies, made a bold and successful stand against a like evaporation of the revealed religion of his fathers: which, indeed, in many cases had led people to throw off its yoke also outwardly. A most zealous champion of Judaism, his bitterness in rebuking those co-religionists who tried to defend their secret or overt apostasy by scoffing at the Law itself, who were 'impatient of their religious institutions, ever on the look-out for matter of censure and complaint against the laws of religion, who, in excuse of their ungodliness, thoughtlessly argue all manner of objections'—knows no bounds. He cannot understand how Jews, 'destined by divine authority to be the priests and prophets for all mankind,' could be found so utterly blind to the fact, that that which is the position only of a few disciples of a truly genuine philosophy—viz., the knowledge of the Highest, had by law and custom become the inheritance of every individual of their own people; whose real calling, in fact, it was to invoke the blessing of God on mankind, and who, when they offered up sacrifices 'for the people,' offered them up in reality for all men.

To P., the divinity of the Jewish Law is the basis and test of all true philosophy. Although, like his contemporaries, he holds that the greater part of the Pentateuch, both in its historical and legal portions, may be explained allegorically, nay, goes so far even as to call only the Ten Commandments, the fundamental rules of the Jewish theocracy, direct and immediate revelations, while the other parts of the Book are owing to Moses: he yet holds the latter to be the interpreter specially selected by God, to whose dicta in so far also divine veneration and strict obedience are due; and again, although many explanations of a metaphysical nature could be given to single passages, yet their literal meaning must not be tampered with. This literal meaning, according to him, is the essential part, the other explanations are mere speculation—exactly as the Midrash and some Church Fathers hold. Only that allegorical method differed in so far from that of his contemporaries, that to him these interpretations—for which he did not disdain sometimes even to use the numbers symbolically, or to derive Hebrew words from Greek roots, and the like—were not a mere play of fancy, in which he could exercise his powers of imagination, but, to a certain extent, a reality, an inner necessity. He clung to philosophy, as combined with the Law. If the former could be shewn, somehow or other, to be hinted at in the latter, then only he could be that which all his soul yearned to be—viz., the disciple of both: a Greek, with all the refinement of Greek culture; and a Jew—a faithful, pious, religious Jew. Nay, he even urged the necessity of allegory from the twofold reason of the anthropomorphisms current in Scripture and from certain apparent superfluities, repetitions, and the like, which, in a record that emanated from the Deity, must needs have a special meaning of their own, which required investigation and a peculiar interpretation. See MIDRASH, HAGGADA. Yet this fanciful method never for

help for that really critical edition, which as yet is a desideratum.—Of the scholars who have written on P., we mention principally Dahl, Bryant, Gfrörer, Creuzer, Grossmann, Wolff, Ritter, Beer, &c. The English translation of P. in 4 vols., forms part of Bohn's *Ecclesiastical Library*.

PHILOLOGY. This word, as a technical name for a branch of knowledge, has gone through various phases of meaning. Originally signifying the love of talk or discourse, and then, in a more restricted sense, the love of philosophical conversation such as is exhibited in the dialogues of Plato, it came, in the later period of Greek literature, to mean the study and knowledge of books, and of the history and other science contained in them. In this sense it passed over to the Romans, under whom the name of philologists was applied to men distinguished for universal learning, more especially to the *grammatici*, whose chief occupation of editing and illustrating the classic poets, naturally led them to this multifarious knowledge; and when Martianus Capella (q. v.) in the 5th c. composed his *Encyclopædia* (q. v.) or curriculum of education, embracing the 'seven liberal arts' (Grammar, Dialectic, Rhetoric, Music, Arithmetic, Geometry, and Astronomy), he designates the collective whole by the name of philology. What is known as the Revival of Literature after the dark ages, is nothing else than the revival of the ancient philology. But when men, instead of looking only at what had been written, began to examine the world for themselves, and enlarge the bounds of science, it became impossible for one man to cultivate the whole round of knowledge, and the term philology was by degrees restricted to a knowledge of the languages, history, laws, &c. of the ancient world (by which the Greek and Roman world was chiefly thought of), or, more narrowly still, to the study merely of the languages—of grammar, criticism, and interpretation. A more complete conception of philology, as an independent branch of knowledge, was that of F. A. Wolf, who assigned as its field all that belongs to the life of the ancient peoples; and the conception is still further extended by Böckh, who makes it almost synonymous with history—its problem being the reproduction of the past; in this sense, the word is applicable to all peoples at all periods of their history, so that we are beginning to have an Indian philology, a German philology, a Slavic philology, no less than a classic philology. The fullest and most systematic exposition of what philology in this sense ought to embrace, has been given by G. Haase in Ersch and Gruber's *Encyc.* 3d sect., vol. xxiii.

Of philology, even in its widest sense, the study of language was always, and necessarily, a fundamental part; and, in the usual sense of the word, it has been the chief part—often nearly the whole. For a long time after the revival of learning, the classic writers were studied chiefly for their language and style, and those of them that did not come up to an imaginary standard of purity were despised and neglected, however valuable they might be for their matter. But although great and even undue attention was thus given to language, it was only as an instrument, as means to an end. The philologist studied a language in order to be able to understand it and use it—to get at the thoughts conveyed in it, or to convey his own thoughts with force and elegance to others. This is the object of the grammars, dictionaries, annotated editions, and criticisms, which constitute the chief part of philological literature. But within recent years, philology has entered upon a new phase, or rather a new study has sprung up alongside of the old. As the naturalist investigates a class of objects not with a view to turn them to use, but to understand

their nature, and classify them; so the new school of philologists examine and compare the structures of the various languages, and arrange them in classes and families, with the ultimate view of arriving at some theory of language in general—its mode of origin and growth. The comparison of the structure of two or more languages is called Comparative Grammar, and the whole of this new branch of study is sometimes designated as Comparative Philology; but it seems better to leave the old field in possession of the old name, and in contradistinction to philology as the practical knowledge of languages, to speak of the study of language as a phenomenon *per se*, as the Science of Language. The German term *Sprachenkunde*, and the French *Linguistique*, have more especial reference to the naturalist, or classificatory aspect of the study.

So long as the view prevailed that language was a human invention, anything like a science of it was impossible. According to that view, which was early started, and was especially elaborated and discussed by Locke, Adam Smith, and Dugald Stewart, it was only after men found that their rapidly increasing ideas could be no longer conveyed by gestures of the body and changes of the countenance, that they set about inventing a set of artificial vocal signs, the meaning of which was fixed by mutual agreement. On this theory, there might be a history of the subsequent course of the different languages, but inquiries into the nature and laws of language after the manner of the physical sciences would be absurd. In opposition to the philosophers who attributed the origin of language to human invention, some theologians claimed a divine origin for it, representing the Deity as having created the names of things, and directly taught them to Adam. Both these theories may now be considered as given up by all who are entitled to speak on the subject. Everything, in fact, tends to show that language is a spontaneous product of human nature—a necessary result of man's physical and mental constitution (including his social instincts), as natural to him as to walk, eat, or sleep, and as independent of his will as his stature or the colour of his hair.

Language was an object of speculation among the Greek philosophers; but as was the case with their inquiries into the outward world generally, they began at the wrong end; they speculated on the origin of things before they had examined the things themselves. They knew no language but their own, and all others were indiscriminately classed as 'barbarous' or foreign; they had no test of affinity among tongues except mutual intelligibility. The theories of the modern philosophers of the 18th c. were nearly as baseless; they were mere *a priori* speculations, akin to Burnet's (q. v.) 'theory of the earth,' which was constructed before the strata of the earth's crust had been explored. The great obstruction to the true course of inquiry was the assumption, first made by the Church Fathers, and for a long time unquestioned, that Hebrew was the primitive language of man, and that therefore all languages must be derived from Hebrew. A prodigious amount of learning and labour was wasted during the 17th and 18th centuries, in trying to trace this imaginary connection. Leibnitz was the first to set aside this notion, and to establish the principle that the study of languages must be conducted in the same way as that of the exact sciences, by first collecting as many facts as possible, and then proceeding by inductive reasoning. It was owing to his appeals and exertions that missionaries, travellers, and others, now began making those collections of vocabularies and specimens of languages and dialects which form the *Herbaria*.

not to be able to love; *sev-dir-mek*, to cause to love; *sev-dir-iah-mek*, to cause one another to love; *sev-il-mek*, to be loved; *sev-il-e-me-mek*, not to be able to be loved; &c. Each of these forms, then, runs through a large round of tenses and moods, with their persons and numbers.

The languages of the American Indians are all of this agglutinating type, although they have also got the name Incorporative, or Intercalative, because they run a whole phrase or sentence into one word—e.g., *hoponi*, to wash; *hopocuni*, to wash hands; *hopoaduni*, to wash feet; *ninacaqua*, I (ni) eat (*qua*) flesh (*naca*). The Basque language partakes of this character.

It is only in the third or *Inflectional* stage that perfect unity of the two elements is attained. In the Aryan and Semitic tongues, which alone have reached this highest state of development, the significant root and the termination have become blended into one both in effect and form, and phonetic changes have for the most part obliterated the traces of composition. Yet no doubt is felt by philologists that the most highly organised of the inflecting or amalgamating languages began with the radical stage, and passed through the agglutinate. The analytic powers of comparative grammar have succeeded in tracing back the formal elements of the Aryan tongues to original independent words, agglutinated to other words to modify them. See INFLECTION. Against this theory it has been urged, that there is no historical instance of a language so changing its type, and passing from one stage to another. But a sufficient account of this phenomenon may be found in the different mental habits and political positions of the peoples (see Max Müller, *Lectures on the Science of Language*, First Series, page 316). Besides, the languages of the lower types do shew a tendency, under favourable circumstances, to produce grammatical forms of the higher kind. Even in Chinese, in some of its modern dialects, something like cases is to be seen; and Finnish and Turkish, in contact with the inflected languages of Europe, are making approaches to the inflectional type.

On the other hand, the inflectional languages had, before the earliest times of which we have any written monuments, entered on the reverse phase—the *analytic*. By the process of phonetic change and decay, the grammatical forms have been gradually becoming obliterated and losing their power, and their place has been supplied by separate words, in the shape of prepositions and auxiliary verbs. See INFLECTION.

Connected with these radical differences of type, is one of the higher and more speculative problems of the science—the question as to the common origin of all languages. The inherent and apparently ineffaceable difference of structure in the three orders above described, as well as the absence of all sure marks of genealogical affinity even between the two families of the inflectional type, the Aryan and the Semitic, are considered by some as insuperable objections to the theory of a common origin. But although it may be fruitless to look for extensive identifications of the roots and grammatical forms of the Aryan tongues, even in the oldest forms to which we can trace them, with those of the Semitic, still more with Chinese or Turkish elements; it seems rash and unscientific to affirm that, going back to the radical stage, the development of all could not have begun from a common stock of monosyllabic roots. The wonderful transformations exhibited by language in the course of its known history, seem sufficient ground for maintaining the *possibility* of a common origin. On the other hand, the nature of the case forbids all hope

of ever being able to *prove* it; for the coincidences that occur (e.g., Chinese *fu*, Tibetan *pha*, Lat. and Gr. *pa-ter*, Eng. *fa-ther*; Chin. *mu*, Egyp. *mu*, Lat. and Gr. *ma-ter*, Eng. *mo-ther*), even though they were much more numerous than they are, might well arise from the mind and vocal organs of man being everywhere essentially the same.

Languages, like living organisms, are in a state of continual flux or change, and an essential part of the science consists in investigating the laws according to which these changes take place. It is because there are such laws that a science of language is possible. In tracing words to their origin, and identifying them with words in other languages, we are no longer guided by mere similarity of sound, on the contrary, identity of sound is often a proof that a proposed etymology is wrong. It has been established, for instance, by induction (see GRIMM'S LAW), that *c* in Latin is regularly represented by *h* in Gothic and English; while for Gothic or English *c*, the corresponding letter in Latin is *g*. Accordingly, we readily recognise Latin *corn-u* and English *horn* as cognate words; while a suggestion to connect the English *corn* with *cornu*, is immediately rejected. If *corn* has a representative in Latin, it must begin with *g*, which points out *granum* as the word. *Grain* is not the English representative of *granum*; it is *granum*, borrowed from the Latin through the French. The expert etymologist can often identify with certainty two words, although not a letter remains the same. In simple cases, this is done by every one. Who, for instance, doubts that Abdershire *fa*, *filk*, are merely dialectic varieties of Eng. *who*, *which*. Yet the same persons who readily admit such cases, are sceptical when it is proposed, for instance, to identify Fr. *larme*, with Eng. *tear*. The grounds of identification, however, are similar in both instances; the only difference being, that with regard to *larme* and *tear*, they require to be traced historically. No one will dispute that *larme* is a corruption of Lat. *lacrima*; in fact, it can be followed through the successive stages of change. Now we know that the Romans had a peculiarity of letting *d* in some positions degenerate into *l*. Nor is this unaccountable, when we consider that the contact of organs which produces *d*, differs from that which produces *l*, chiefly in being more energetic; a slovenly *d* slides into *l*. Thus the Greek name, Odysseus, became, in the mouth of the Romans, Ulysses; they said *odor* (a smell), but *oleo* (I smell); and, instead of *impedimentum*, *delicare*, we sometimes find *impelumentum*, *delicare*. These and other instances would warrant us to conclude that *lacrima* was a corruption of *dacrima* (corresponding to Gr. *dakru*), even if we had not the express statement of Festus that *dacrima* was the older form. After this there is no difficulty in recognising *dacri*, or *dakru*, as identical with Gothic *tagr*, Eng. *tear*.

In order to give a rational account of the phonetic changes now exemplified, the nature of articulate sounds, and of the organs that produce them, must be carefully investigated. The most valuable contributions, in English, to this important preliminary branch of the study (called *Phonetics*), are those of Mr Alex. J. Ellis. See PHONETIC WRITING. An admirable *résumé* of the subject, with diagrams of the organs of voice in the position of pronouncing the different articulations, is given in the second series of Max Müller's *Lectures on the Science of Language* (1864), where the best recent works on phonetics are noted.

The transformations that words exhibit, as they are traced down the stream of history, are of the nature of phonetic decay, and are due to a natural

sounds. We can see, again, a physiological fitness in the articulation *etc.*, to stand; with the idea of stability, still more with the attitude, the organs involuntarily assume the position with which this syllable is emitted. Similar instances might be multiplied. We are not to suppose that the same thing would suggest the same sound to all, or even to the same individual at all times. The language-making faculty in the flush of its spring would throw out a multitude of names for the same thing (synonyms), as well as apply the same name to many different things (homonyms); but by a process of natural elimination, those only would survive that were felt best to answer the purposes of speech. The abstracting faculty would also soon dissociate them from the concrete individual objects that first suggested them, and convert them into symbols of the prominent attributes of whole classes. It is these generalised names, syllables significant of such general simple notions as seeing, moving, running, shining, striking, cutting, or being sharp, that, by a kind of inverse process, became the roots of language as it now exists. A syllable expressive of a single prominent attribute forms the foundation of the names of a whole class of objects, the specific differences being marked by other significant syllables joined on to it. See *Roots*. In some such way, by the unconscious working of man's intellectual nature, we may conceive language to have grown out of the exclamatory or interjectional stage into the rational structure that we now admire. This theory of the origin of roots, together with the constant operation of phonetic change, accounts for the absence of all traces of onomatopoeia in the great bulk of the words of a language, and seems to meet the objections of Max Müller and other philologists to the onomatopoeic theory.

With regard to these primary or radical words it is only necessary to observe here that they are all significant of sensible or physical ideas, and expressions for immaterial conceptions are derived from them by metaphor. How, from a comparatively few roots of this kind, the vocabulary of the richest language may grow, is further illustrated in the article *Root*.

Another speculative question regards the length of time that language must have taken to advance from the rudimentary stage to the state in which it is found in the earliest records. Bunsen assigns 20,000 years as the lowest limit; but it is evident that the same uncertainty must always rest on this question as on the corresponding one in geology.

Separate points of philology will be found treated under a variety of heads. See—besides the articles already referred to—*ALPHABET*; the several letters, *A, B, &c.*; *GENITIVE*; *NOUN*; *ADVERB*; *PRONOUN*; *DIALECT*; *PERSIAN LANGUAGE AND LITERATURE*; *SEMITIC LANGUAGES*; &c.

The literature of the new science of language is already rich; but much of it is scattered through the transactions of societies and periodicals. Of separate works of a comprehensive kind, in addition to those already named, we may mention, in German, Schleicher, *Die Sprachen Europas* (Bonn, 1850), and *Vergleichende Grammatik der Indo-Ger. Sprachen* (2 vols. Weimar, 1861); J. Grimm, *Ueber den Ursprung der Sprache* (Ber. 1852); Diez, *Etymol. Wörterbuch der Romanischen Sprachen* (2d ed. Bonn, 1861), and *Vergleichende Grammatik der Romanischen Sprachen* (3 vols. Bonn, 1836—1842); translations of both works into English have been published by Williams and Norgate (1864). Heyse, *System der Sprachwissenschaft* (Ber. 1856); Steintal, *Die Classification der Sprachen* (Ber. 1856); and *Der Ursprung der Sprache* (Ber. 1851). In French,

Renan, *Histoire Générale et Système comparé des Langues Sémitiques* (3d ed. Paris, 1863); and *L'Origine du Langage* (3d ed. Paris, 1863); Pictet, *Les Origines Indo-Européennes* (Paris, 1859).

English scholars were late in entering this field of research. Horne Tooke's (q. v.) *Diversions of Purse*, though a work of genius, and though it has been the means of first awakening in many an interest in the nature of language, was written without sufficient acquaintance with the kindred tongues, and before the true key to the inquiry had been obtained, and therefore few of the results can now be accepted. Among the first important contributions were Prichard's *Eastern Origin of the Celtic Nations* (Oxf. 1831), and the contributions of the Rev. Richard Garnett to the *Quarterly Review* in 1835—1848. Mr Garnett's essays in the *Quarterly*, and his subsequent papers printed in the proceedings of the London Philological Society (in the formation of which, in 1842, he took an active part), have been reprinted under the title of *Philological Essays* (Williams and Norgate, 1859), and are models of linguistic research. The philological articles of the *Penny Cyclopædia* also contributed to popularise the study in England. Of substantive works, the most important, though bearing more directly on the Greek and Latin tongues, are *The New Century* (1839, 3d ed. 1859), and the *Varronianus* (1844 of J. W. Donaldson (q. v.)). Winning's *Manual of Comparative Philology* (1838) had previously given a popular sketch of the affinities of the Aryan languages. Latham's *English Language* (1841—several new editions) treats its subject from the historical-comparative point of view, and therefore comes in some degree within our scope. A valuable work of the same kind is Marsh's *Lectures on the English Language* (New York, 1860). Latham's *Elements of Comparative Philology* (1862) gives an elaborate classification of the languages of the world, with numerous specimens; only a small part of the work (56 pages out of 752) is given to the general principles of the science. Farrar, *On the Origin of Language* (1860), chiefly deals with the speculative part of the subject; he brings within small compass the views of the leading investigators on the more interesting points. But above all, the writings of Max Müller (*Comparative Mythology*, in the *Oxford Essays*, 1856; *Lectures on the Science of Language*, 1861; Second Series, 1864) have contributed to make the study of this science take root in Britain.

On the principles of classification above sketched, the chief languages of the earth may be thus arranged:

I. *Mono-syllabic or Isolating*.—1. Chinese, the typical language of this order. 2. Tibetan, which shews some beginnings of grammatical forms. 3. The languages of the Eastern Peninsula—Siamese, Anamese, Burman. Japanese and the language of Corea are doubtful.

II. *Agglutinate*.—1. The most important division of this order is the Turanian family, comprising the languages spoken in Asia and Europe (including Oceania), and not included under the Aryan and Semitic families, with the exception of Chinese and its cognate dialects. For the subdivisions of this family, see *TURANIAN LANGUAGES*. 2. *Afric Languages*.—Some of the languages of Africa allied to the Semitic family, and were introduced by immigration, such as the dialect of Tigre in Abyssinia (see *ETHIOPIA*), and the Arabic dialect spoken by the Mohammedan population of the coasts, and which have even penetrated deep into the interior. How far the Berber dialects are of Semitic character, is a disputed question; and the same is the case with the language of the Gallas and

in both. A valuable contribution has recently understood from the accompanying tables, taken from made to the study of part of the field by, from Max Muller's Lectures, First Series.

No. I.—GENEALOGICAL TABLE OF THE ARYAN FAMILY OF LANGUAGES.

Living Languages.	Dead Languages.	Branches.	Classes.	
<ul style="list-style-type: none"> of India, . . . { the Gipsies, . . . Persia, . . . Afghanistan, . . . Kashmirian, . . . Bokhara, . . . Armenia, . . . Ossetid, . . . Vulgar, . . . Brittany, . . . + . . . Scotland, . . . Ireland, . . . Man, . . . Portugal, . . . Spain, . . . France, . . . Italy, . . . Wallachia, . . . the Gipsies, . . . Albania, . . . Greece, . . . Lithuania, . . . + . . . Eurland and Livonia, . . . (Lettish), . . . Bulgaria, . . . Russia (Great, Little, . . . White Russian), . . . Illyria (Slovenian, . . . Croatian, Servian), . . . P. Land, . . . Bohemian (Slovakian), . . . Lusatia, . . . Germany, . . . + . . . England, . . . Holland, . . . Friesland, . . . North of Germany . . . (Platt-Deutsch), . . . Denmark, . . . Sweden, . . . Norway, . . . Iceland, . . . 	<ul style="list-style-type: none"> Prakrit and Pali—Modern Sanscrit.—Vedic Sanscrit Parsi—Pehlvi—Cuneiform Inscriptions—Zend Old Armenian Cornish Langue d'oec } Langue vulgaris { Oceanic Latin Umbrian Langue d'oïl } Kera { Doric—Eolie Attic—Ionic Old Prussian Ecclesiastical Slavonic Old Bohemian Polish Middle High-German, Old High-German Gothic Anglo-Saxon Old Dutch Old Frisian Old Saxon Old Norse 	<ul style="list-style-type: none"> Cymric Gaelic Oscean Latin Umbrian Illyric Hellenic Lettic South-East Slavonic West-Slavonic High-German Low-German Scandinavian 	<ul style="list-style-type: none"> Indic Iranic Celtic Italic Illyric Hellenic Wendic Teutonic 	<ul style="list-style-type: none"> Southern Division Northern Division

No. II.—GENEALOGICAL TABLE OF THE SEMITIC FAMILY OF LANGUAGES.

Living Languages.	Dead Languages.	Classes.	
<ul style="list-style-type: none"> Dialects of Arabic, . . . Amharic, . . . + . . . the Jews, . . . + . . . + . . . Neo-Syriac, . . . + . . . 	<ul style="list-style-type: none"> Ethiopic Hebraic Inscriptions Biblical Hebrew Samaritan Pentateuch (3d c. a. n.) Carthaginian, Punician Inscriptions Chaldee Masora, Talmud, Targum, Biblical Chaldee) Syriac Pesito, 3d c. a. n.) Cuneiform Inscriptions of Babylon and Nineveh 	<ul style="list-style-type: none"> Arabic or Southern Hebraic or Middle Aramaic or Northern 	SEMITIC FAMILY.

PHILOMELA, the name of a personage in Greek legend, who was changed according to one account into a swallow, to another into a nightingale. Modern poets are (or rather were, for it was chiefly an 18th c. fashion) fond of calling the nightingale by its classic name.

PHILOPEMEN, the most illustrious patriot and general who figures in the later history of Greece, belonged to one of the best families of Arcadia, and was born at Megalopolis about 252 B.C. At an early age he lost his father, and was brought up by a wealthy citizen, named Cleander, who took care that he should receive an excellent education. His earliest experiences of war were confined to the border raids of the Arcadians into Laconia; but in 222 B.C. he was one of the defenders of Megalopolis against Cleomenes, king of Sparta. Next year, when the Macedonian king Antigonus marched to the assistance of the Achæans, P. joined him at the head of 1000 horse, and contributed materially to the terrible defeat which the Spartan king received at Sellasia. As tranquillity was now for a short time restored to Greece, P. went abroad to perfect himself in the art of war, and served in Crete with such distinction, that on his return to the Peloponnesus, in 210, he was appointed general of the Achæan horse, and at once proceeded to discipline his men in a vigorous and masterly style. In the expedition against Elis (209) he slew the Elean leader, Demophantus, with his own hand. In 208 he was raised to the highest military dignity then possible in Greece, being elected *strategus* or commander-in-chief of the Achæan League, and in this capacity signalled himself by the great improvements which he effected in the drill, discipline, and armour of the Achæan soldiery. It seemed as if the ancient heroism of the land were reviving. The battle of Mantinea, which took place in the course of the same year, and in which the Spartans were again utterly routed—their general and king, Machanidas, falling by the sword of P. himself—raised him to the pinnacle of fame, and at the Nemean festival which followed he was proclaimed liberator of Greece. His exalted honours did not in the slightest degree disturb the integrity of his character. So great was his influence over his quarrelsome countrymen, that the Macedonian monarch, Philip, began to fear that Greece would regain its independence, and tried to have him secretly assassinated; but the infamous treachery was discovered in time, and its only effect was to endear P. still more to the Achæans. Another of his determined enemies was Nabis, successor of Machanidas in the 'tyranny' of Sparta, but in 201 he inflicted on the latter a severe defeat at Skotetas on the borders of Laconia. During the next few years he was absent in Crete, partly, it would seem, for political reasons, but returned to the Peloponnesus in 194 to find matters in a serious condition. A new and dreaded power—the Romans—had appeared, and overthrown both Philip and Nabis, and P. foreboded future mischief to all Greece from these ambitious warriors. On the departure of the consul Flaminius, Nabis recommenced hostilities against the Achæans; P. was once more appointed *strategus* (192); and in a pitched battle nearly annihilated the troops of Nabis, who himself was shortly afterwards killed by the Ætolians. He now exerted all his power to heal the divisions among the Achæans, and to prevent them from affording the Romans a pretext for taking away their independence. In 188, he took a fierce revenge on Sparta for having put a number of his friends to death, and was in consequence strongly censured by the Roman senate, and by Q. Cæcilius Metellus, who was sent out as a commissioner to Greece in 185. Two years later P. (now an old man of 70),

was elected *strategus* for the eighth time. When lying ill of a fever at Argos, news was brought to him that the Messenians had broken their connection with the league; P. instantly rose from his sick bed, hastened at the head of some cavalry to quell the revolt, but was overpowered by numbers, and fell into the hands of Deinocrates, the leader of the Messenians, who two nights after sent him a cup of poison, which P. drank off and died. The remains of the hero were brought in solemn procession to his native city—the historian Polybius carrying the urn—and statues were erected to his memory by his grateful and repentant countrymen.

PHILOSOPHY. This word meant originally the 'love of knowledge,' and indicated, therefore, a special taste, appetite, or desire, of which the subject-matter was knowledge. At first, man's pursuit of knowledge was subservient to the immediate uses of life; but, in the course of time, an interest was taken in knowing the order of the world, independent of its application to the common utilities. We find that this stage had been reached in Greece especially, about five or six centuries before Christ: at which time the name 'philosophy' took its rise, being attributed to Pythagoras.

The word has had a variety of acceptations, although all pervaded by the one idea of employing the human understanding in the search for increasing knowledge and certainty. It always implies this effort in a distinguished degree, such as only a few persons in any age have ever been able to sustain. The pursuit of knowledge had to become an end in itself, for the mere improvement of practice would not at first have been a sufficient motive for men to undergo the labours of scientific inquiry. Indeed, this improvement was not at all apparent as a consequence of the earliest efforts of speculation. As one celebrated example, the investigation of the properties of the sections of the cone—the ellipse, parabola, and hyperbola—was without any practical use for nearly two thousand years.

As may be readily supposed, the precise aim of philosophy, the statement of what constitutes its end, has varied with the advancement of its study. In modern times, the pursuit of truth has taken a well-defined form, expressed by the name Science (q. v.). But, in the ancient world, this operation was a mixture of speculation, practice, and sentiment—of legitimate inquiry with aspirations after the unattainable; and hence the word 'philosophy,' in its modern employment, often refers to the subjects that have not as yet adopted the strict scientific form. On this view, science is the goal and the grave of philosophy. (See Lewes's *Biographical History of Philosophy*.) It is chiefly with reference to morals, metaphysics, and the human mind generally, that the term is still retained.

The characters that distinguish the highest form of truth are Generality and Certainty or precision; and in proportion as a subject has advanced in these respects, it might be said to have become philosophical, but we now prefer to use the word scientific. The theoretical foundations of a practical subject, as grammar, are sometimes pretentiously called the philosophy of it. So any department of nature or humanity, where explanations by general laws are furnished, is styled 'philosophical'; thus, we have the philosophy of zoology or of history, and a 'philosophical' naturalist or historian.

Again, after definite branches of knowledge have taken a scientific shape, and have been reckoned as distinct 'sciences' (mathematics, &c.) the general principles and views that are supposed to run through the whole, are sometimes called 'philosophy.' This was one of the meanings of the word

(q. v.). From this time, 'philosophy' comes to mean more exclusively the inquiries connected with the mind, as exemplified in the writings of Hobbes, Locke, Leibnitz, Berkeley, Hume, Reid, Kant, &c. The qualified phrase, Natural Philosophy (in the English sense), was applied to a special department of the outer world, as Moral Philosophy was used in connection with mind and the discussion of moral duties. The chief points in the history of modern philosophy will be found under the heads of GERMAN PHILOSOPHY, ECLECTICISM, COMMON SENSE, PERCEPTION, METAPHYSICS, ETHICS; and in the notices of BERKELEY, LOCKE, HUME, REID, KANT, HEGEL, FICHTE, COUSIN, HAMILTON, &c.

PHILOSTRATUS, the Elder, of Lemnos, a famous Greek sophist and rhetorician, was born probably about 170—180 A.D., studied under Proclus at Athens, and finally established himself at Rome, where he became a member of the brilliant and learned circle that gathered round the 'philosophic' Julia Domna, wife of Severus. He was alive, according to Suidas, in the time of the Emperor Philip (244—249). He is the author of a number of works still extant, and not without value on account of their matter, although the style and arrangement are faulty. Among them are a life of Apollonius (q. v.) of Tyana, a description of a collection of paintings at Naples under the title of *Imagines*, biographies of a number of sophists, *Heroica*, Letters, &c. There are complete editions of his works by Morel (Paris, 1608); Olearius (Leip. 1709); and Kayser (Zur. 1844, *et seq.*), of which the last is by far the most correct and critical.—**PHILOSTRATUS** the Younger, called Philostratus the Lemnian, also a teacher of elocution, was an intimate friend, perhaps a relative of the former, but nothing is known with certainty regarding him.

PHILTHER, PHILTRE (Gr. *philtron*, love-charm, love-potion). A superstitious belief in the efficacy of certain artificial means of inspiring and securing love, seems to have been generally prevalent from very early times; and among the Greeks and Romans (among the latter in the later days of the republic, and under the emperors), love-charms, and especially love-potions, were in continual use. It is not certainly known of what these love-potions were composed—nor can we rely entirely on the details given us on this subject by classic writers, and their commentators in later time—but there is no doubt that certain poisonous or deleterious herbs and drugs were among their chief ingredients, to which other substances, animal as well as vegetable, are said to have been added, coupled with the employment of magic rites. Thessaly had the credit of producing the most potent herbs, and her people were notorious as the most skillful practisers of magic arts, whence the well-known 'Thessala philtre' of Juvenal (vi. 610). These potions were violent and dangerous in operation, and their use resulted often in the weakening of the mental powers, madness, and death, instead of the purpose for which they were intended. Lucretius is said to have been driven mad by a love-potion, and to have died by his own hand in consequence—though the story does not perhaps rest on sufficient authority; and the madness of the Emperor Caligula was attributed by some persons to love-potions given him by his wife Caesonia—by which also she is said to have preserved his attachment till the end of his life. In the corrupt and licentious days of the Roman empire, the manufacture of love-charms of all kinds seems to have been carried on as a regular trade; the purchasers, if not the makers of them, being chiefly women. The use of philters seems to have been not unknown during the middle ages; and in the

East, the nurse of superstition of all kinds, belief in the power of love-potions lingers probably down to the present day.

PHLEBENTERISM is a term invented by De Quatrefages to designate an anatomical arrangement, existing, as he supposed, in certain of the nudibranchiate molluscs, and characterised by ramified prolongations of the digestive tube, in virtue of which the digestive apparatus, to a certain extent, supplies the place of a complete circulatory apparatus, and aids in the process of respiration. The researches of Alder and Hancock, and other zoologists, seem, however, to shew that in these animals the circulation is as complete as in the gasteropodous molluscs generally, and that these ramified prolongations are of the nature of a rudimentary liver. For further information on this subject, the reader is referred to De Quatrefages's *Rambles of a Naturalist*, vol. i. pp. 348—353.

PHLEBITIS, or INFLAMMATION OF THE VEINS (Gr. *phleps*, a vein), although seldom an original or *idiopathic* disease, is a frequent sequence of wounds, in which case it is termed *traumatic* phlebitis (from the Greek *trauma*, a wound), and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers. The hardness is, however, sometimes obscured by the swelling of the limb beyond and about the seat of the disorder, partly in consequence of the effusion of serum caused by the obstruction to the return of the venous blood (which thus gives rise to a local dropsy), and partly in consequence of the propagation of the inflammation to the surrounding tissues. The inner surface of the inflamed vessel is supposed to throw out fibrinous fluid, which coagulates in layers, and finally closes the tube. If the vessel is small, the consequences of its obstruction may be of little importance, but when a large vein is affected, the consequences are always dangerous, and may be fatal.

There are two modes of recovery: solution of the coagulated fibrine may take place, and the vessel may again become pervious; or, as is more commonly the case, the obstruction may continue, but a collateral venous circulation may be established, and the circulation thus carried on through a circuitous route. With the return of the circulation—in whichever of these two ways it is accomplished—the swelling subsides, and the patient gradually recovers. If, however, the disease advances, suppuration takes place within the coagulum, and one of two things happens; either abscesses are formed along the vein, or the pus gets into the current of blood and contaminates the circulation, giving rise to the perilous disease known as *Pyæmia* (q. v.). Either condition is dangerous; the latter pre-eminent so.

Phlebitis generally originates in some local injury of a vein, and the inflammation, when once established, is readily propagated along the course of the vessel. Sometimes very slight injuries give rise to it. It occasionally occurs after venesection, especially with a dull lancet, or one soiled by contact with diseased matter. Women are peculiarly liable to this disease after delivery, as the veins of the womb are apt to become inflamed, and to communicate the inflammation to the venous trunks connected with them. See **PHLEGMASIA**.

There is considerable difference of opinion as to the treatment to be pursued; some high authorities (Dr Wood, for example) recommending 'the very free use of leeches along the affected vein,' and that they should be repeated over and over again if the

and Syncellus, Herodotus, Diodorus, Justinus, and others, together with a very few notes scattered throughout the Church Fathers, contain the sum of all our information. Four great periods, however, are clearly distinguishable in the history of ancient Phœnicia. The first would comprise the earliest beginnings and the gradual development of the single states and tribes, from their immigration to the historical time when Sidon began to take the lead, or about 1500 B.C. The second period dates from the conquest of Palestine by the Hebrews. Sidon had then become already the 'first-born of Kanaan,' as Genesis has it, or 'Sidon Rabbah,' the Great Sidon. The flourishing state of its commerce and manufactures appears likewise from several passages in Homer. The silver vase proposed by Achilles as a prize in the funeral games in honour of Patroclus, was a work of the 'skilful Sidonians;' the garment Hecuba offers as a propitiatory gift to Minerva was the work of Sidonian women. The gold-edged silver bowl given to Telemachus by Menelaos, Hephaistos had received from the king of the Sidonians. Ulysses is left on the island of Ithaca by the Phœnicians, who sail away to 'well-peopled Sidonia.' The gradual ascendancy of the rival city of Tyre marks the beginning of the third period, in which P. reaches the height of its power, in which her ships covered all the seas, her commerce embraced the whole earth, and her innumerable colonies flourished far and near. The first historically-recorded item of Tyre's activity is her foundation of Gades, a few years before that of Utica, in 1100 B.C. The reason of the sudden greatness of Tyre is to be found in the defeat of the Sidonians by the king of 'Askalon'—a term probably meant to represent the whole pentapolis of Philistia—about the year 1209; in consequence of which, the principal families of Sidon 'emigrated in their ships to Tyre, which [viz., the Island-city] they founded.' In the 11th c., in the time of Samuel, 'the princes of the Tyrians' are already spoken of instead of the Sidonians, as the representatives of Phœnicia. During the reigns of David and Solomon—under Hiram (980—917)—the friendliest relations existed between the two nations: both in the full bloom of their power. Each country needed what the other could supply. Hence their close alliance, which led even to common commercial enterprises in ships built by Solomon, the supercargoes of which belonged to him, while the mariners and pilots were Hiram's.

By this time, Phœnician colonisation had reached its utmost extent. In the space of three centuries (1300—1000), the Phœnicians had covered all the islands and coasts of the Mediterranean with their forts, their factories, and their cities; and their ships, which ploughed the main in all directions, everywhere found their own ports. They had colonised Cyprus, thus commanding the waters of the Levant and the coasts of Syria and Cilicia. Kithion, Amathus (Hamath), Karpasia, Paphos, with its magnificent temple of Ashera, Keryneia, and Lapothos, were some of their principal settlements in those regions. Northward, on the coast of Cilicia, they founded the cities of Myriandros, Tarsos, and Soloi. Migrating to the west, they took possession of Rhodes, Crete (cf. the Myth of Zeus and Europe), Melos, Thera, Olios (near Paros), and Cythera, on the coast of the Peloponnese. To the east of the Ægean, we find them at Erythra, and further, as masters of the islands of Samothrace, Lemnos, and Thasos with its wealth of gold mines. The Ægean Sea, with all its islands, being in their hands, they sailed thence further west, to Sicily, where they settled at Motye, on the extreme west point; founded Rus

Melkarth, in the south (Heraclea Minoa); in the north, Machanath (Panormos, Palermo), and further, Melite (Malta) and Gaulos. They owned Caralis (Cagliari) in Sardinia, Minorca, Iviza (Ebusos, Elba); on the opposite, or African coast, Hippo, Utica, Hadrumetum, Leptis, and some minor island states. From Sardinia and Minorca, the indomitable mariners went still further west—through the Strait of Gibraltar to Tarshish (the California of those days) or Spain, where they founded Gadir or Cadiz, and in the south, Karteja, Malaka, and Abdarach. From here, having colonised well-nigh the whole of the Spanish coast, they went northwards to the tin islands (Scilly Isles), and to Britain herself. And while they thus explored the regions of the Atlantic, their alliance with the Hebrews had permitted them to find the way to the Indies by the Red Sea.

The impulse given to industry and the arts by this almost unparalleled extension of their commercial sphere, was enormous. Originally, exporters or traders only for the wares of Egypt and Assyria, they soon began to manufacture these wares themselves, and drew the whole world into their circle of commerce. As to the early and most extensive commercial intercourse between P. and Greece and her colonies, nothing can be more striking than the circumstance of nearly all the Greek names for the principal objects of oriental commerce being Phœnician, or rather Semitic—identical almost with the terms found in the Old Testament. Thus, of spices—myrrh, cassia, cinnamon, galbanum, nard, aloe, crocus, nitron, balsam, &c.; of jewels and precious stones, sapphire, jasper, smaragdus; of fine materials, and garments, byssus, karpasos, sindon, &c.; musical instruments—nabla, tympanon, sambyke, &c.; oriental plants, vessels, and even writing implements. The wealth of silver, iron, tin, and lead was chiefly got from Tartessus. The descriptions of the abundance of precious metals there verge on the fabulous. Thus, the Phœnicians are supposed to have made even their anchors of silver, when they first discovered the country, not knowing how to stow away all the silver in their vessel. What must have been the state of these mines is clear from the fact, that, even in the Roman time, 40,000 men were constantly employed as miners, and the state received a clear revenue of 20,500 drachms daily. The 'Fortunate Islands,' which, according to Diodorus, they discovered after many days' sailing along the coast of Africa, beyond the Strait of Hercules, and which, to judge from the name *Purpurana* given to some islands off the coast of Mauritania, would seem to have been the Canaries, yielded them the shell-fish *purpura*, so useful for their dyeing manufactories. Besides their wholesale commerce carried on by fleets and caravans, they also appear to have gone about the interior of Syria and Palestine, retailing their home or foreign produce.

Although the Phœnicians were erroneously believed, by the western tribes, to manufacture all the wares in which they dealt themselves, yet no inconsiderable number of them was really their own work. None of their manufactures, however, stood in so high repute throughout antiquity as the purple dye prepared from the *muricea*, a shell-fish of its coast; and none excelled more in it than the Tyrians. Purple was an almost indispensable luxury of antiquity, particularly in Asia. In temples and palaces for gods and men, purple garments, hangings, curtains, and veils were needed; and Alexander the Great found in Susa alone a store of purple worth 5000 talents. Sidon's principal production was glass—invented there, it was said, by

Numen, or the principle of their chief Deity, was probably the same with all—those Phœnicians who dwelt in the north differed in some respects, such as the names and attributes of certain gods, from those of the south. Besides this, it must not be forgotten that the period of Phœnician history ranges over 2000 years, and their political career, as well as their commerce, brought them in close and constant contact with nearly all the civilised nations of the then known world; and being both superstitious (as sailors and traders are prone to be), and possessed of an adaptability to which partly they owed their success in other respects, they easily, if not greedily, received into their wide pantheon those who, albeit the special national gods of others, or because of this very reason, could either harm or benefit them. It may be also that a certain easy nonchalance about these things, such as the wealthy and aristocratic classes displayed in ancient Rome and elsewhere, and the interest of the priests, who received very considerable tithes of every sacrifice (oddly enough, our information on that point leaves nothing to be desired), went hand in hand to favour the gradual introduction of as many gods and goddesses as pleased the herd. Their proper divisions, however, their real names and derivations, and the history and time of their nationalisation, are things which will for ever continue to puzzle investigators.

Setting aside such more or less vague and undefined names of deities as were common to the whole Semitic stock, and as they are found in the Hebrew records—like *El* (Mighty One), or (in plural) *Elohim*; *Olonim* [*Elyon*] (the Most High); *Adon* (Lord); *Melech* [*Moloch*] (King); &c.—we find in the first rank of gods (of Tyre and Sidon) *Baal* (q. v.) and *Astarte* (q. v.) *Baal* again occurs in two different characters, as it were—as *Baalsamin* (Lord of Heavens), the highest god ruling over the Universe, the Zeus Olympios, and Jupiter Optimus Maximus; and as *Baal Melkarth*, the special national numen. *Baalsamin* is originally identical with the Babylonian *Bel* or *Baal*. The third supreme Tyrian goddess was *Astarte*, worshipped as the very counterpart of the Sidonian *Astarte*. While the latter was considered a pure virgin, whose emblem was the moon, the former (the biblical *Ashera*) was propitiated (as Venus, goddess and planet) by prostitution. The Tyrian *Astarte* was principally known under the name of *Tanis* (q. v.), the Assyro-Persian *Tanis*, and was married to *Baalsamin*, and also to *Adonis*, and bore altogether the character of a goddess who delighted in chastity.

The principal deities of Northern P.—the non-Sidonians—consisted of a different trias—*El*, *Baal*, and *Adonis*. The first was the supposed founder of the two oldest Phœnician cities of Byblus and Berytus, and corresponded to (being originally, perhaps, identical with) both *Baalsamin*, as the highest deity, and *Melkarth*, as the special god of Tyre. *Baal*, *Beltis* (My Lady—Aphrodite), worshipped at Byblus, Berytus, Aphaka, Arke (Architis), &c., was joined to *Adonis* (q. v.), whose cultus had been imported from Assyria, and is therefore unknown in the more ancient Phœnician colonies, in Africa and Spain. Byblus called him *Adonis Ganas*, or *Ganan* (perhaps *Gaan*, the Exalted), near Byblus, we find him worshipped as *Elyon* (the Highest); as *Esmun* in Berytus, and perhaps also under the name of *Memnon*, at Apamea, where an annual mourning-festival was celebrated in his honour; further, near the river *Bandas* at Paltos; and at the river *Belus*. As *Serach* (the Brilliant) in Phœnician, and *Kharush* (the Sun) in Persian, he appears to have had some relation to the star-and-planet worship which became, under Assyrian

influence, a prominent feature of the Phœnician religion.

Besides these more or less localised gods and goddesses (*Dii Majores*), a certain number of deities—states and country deities—were worshipped in common by all Phœnician states. They were called the Children of *Sadik* (the Just), or the Children, or the *Pataki* (Descendants of *Phtha*), or the eight *Kabiri* (Strong Ones). They are the maritime gods, and their images were placed on the prows of Phœnician ships. As protectors of navigation, they are identified with the *Dioscuri*; and again, as representatives of heat, breath, and life, they received the names of *Lares* and *Penates*. Their individual names are not generally mentioned; they seem (cf. *Esmun* = eighth) to have been merely counted. Their mode of worship was most mysterious—as indeed some of the earliest mysteries were closely connected with it.

Besides these, they also worshipped certain phenomena, personified attributes, and qualities. Their planetary divinities were the Sun and his four horses—to whose worship belongs, among others, to a certain extent the annual festival of the Resurrection of the (Tyrian) *Herakles*, under the emblem of a column in the form of a rising flame (*Chaman*); the Moon with her chariot drawn by white bulls; the planet *Mars* (*Aziz* or *Nergal*); *Jupiter* (*Kochab* *Baal*); *Venus* (*Astoret* *Naamah* = lovely *Astarte*), with her voluptuous cultus; and *Saturnus* (*Moloch*, *Kronos*), the evil principle. The elements were revered either in conjunction with certain deities or on their own account. The water, to which sacrifices were offered both in the shape of human beings and animals or fruits, was hallowed in all its shapes—as the sea, as rivers, fountains, lakes—by which people took their most solemn oaths; the fire, in connection with the oldest deity of P.; the light (*Moloch*); the air and the winds; the earth and all its plants, its forests, and glens, and trees, and more especially its mountains, as the 'symbols of the High Ones,' or as 'Faces of God,' such as Mount *Carmel*, *Lebanon*, *Antilibanus*, and others. Of animal-worship we have only small traces.

Abstract notions and ideas were not forgotten. The Year and the Months, Day and Night, *Aurora* (*Lilith*), Age and Youth, Art and Love, had their altars. Nor were certain professions and trades without their visible patrons. Thus, there are gods of agriculture and horticulture, like *Dagon*, the god of grain; a *Dionysos*, whose Phœnician name is lost, as the god of wine-growers; a god who is the numen of fruit-growing, of pisciculture, of mines, &c. Chthonian gods are not wanting. The god of Death—the king of the lower regions—is *Muth* = Death (*Pluto*), who is represented as a small child. His reign was shared by a goddess whose name is vaguely known as *Elohi* (My Goddess), and who is occasionally identified with *Astarte*, *Dido*, *Anna*, *Persephone*, *Europa*, and a great many other deities.

We have already touched upon the mode of worship of the Phœnicians, and the places chiefly selected for their rites. Mountains, heights, rivers, lakes, fountains, meadows, glens, were, as we said, the favourite habitations of the gods. But the Phœnicians were also amongst the first who erected temples. These were generally divided in two parts, containing the sacred arks (the mystic cists of the Greeks); and the chariots upon which the sacred objects were at times carried about. Not being intended to be prayer-houses, but as dwelling-places for special gods, they were rather small, and did not even contain the altar upon which the sacrifices were offered. This generally stood at the entrance of the temple, and around it the

than the Hebrew, which gradually transformed and refined it by grammatical niceties. Another feature is the preponderance of the Chaldee, or rather Aramaic words and forms—although here again we are on very dubious ground. It might further be questioned whether our Phœnician Inscriptions—all belonging to a very late period—are not rather a faithful reflection of the Hebrew of their period, which, since the 8th c. B.C., had more and more changed into Aramaic. So much is certain, that the original language of Canaan was perfectly free from Chaldaisms, and that these are but a late corruption—such as we also find in the later books of the Old Testament. Yet there are other features quite peculiar to the Phœnician, which—although not of sufficient importance to warrant our separating the dialect entirely from the Hebrew—are of a nature not to be explained by any Semitic analogy; such as certain differences in the pronunciation of vowels, in the treatment of consonants, the formation of pronouns, some verbal forms, and certain words entirely foreign to the Semitic. Again, a distinction is to be made between the Phœnician of P. and that corrupted form of it spoken in the western colonies, called Punic, and further, that idiom peculiar to the inhabitants of Leptis, called Libyo-Phœnician—a mixture of Phœnician and Libyan, with a vast preponderance, however, of the former element.

The difference in the pronunciation may be briefly characterised as a tendency towards an obscuring or lowering, as it were, of the vowels: thus, the Hebrew *a* is changed into *o*, the *e* into *i* or *y*, *i* into *y*, sometimes into *u*, and *o* into *u*. Peculiar is also the use of the Hebrew *Ayin* as a vowel (*mater lectionis*), with the pronunciation of *o* or *u*. On some occasions, however, it is entirely omitted. The gutturals are changed at times, as in the corrupted orthography of Samaritan and Sabian, so that *L* and *R* are sometimes assimilated with the next consonant in the middle of the word, or entirely omitted, &c. As to grammar, our knowledge is extremely limited. A few undoubted facts are the termination of the nominative form in *al* instead of the Hebrew *ah*, the greater variety of genitive forms in Phœnician, the difference in the formation of the pronoun, and the identity of the article with that in Hebrew (*ha*). For the Phœnician alphabet, the model of all European alphabets, see ALPHABET.

The Literature of P., in its original form, has, as we said, perished entirely. What traces and fragments we have of it, have survived in Greek translations. But from even these small remnants, we can easily imagine the extreme antiquity, and the high importance and vast extent of these productions, which, at first, seem to have been chiefly of a theological or theogonical nature. Their authors are the gods themselves, and the writings are only accessible to the priests, and to those initiated in the mysteries. From the allegorical explanations of these exalted personages sprang a new branch of sacred literature, of which those fragments of Cosmogony mentioned above are derived. To the literary age of Taaut, Kadmus, Ophion, Esmun, &c., succeeded Thabion, Isiris, Sanchuniatho, and Mochus, who founded the schools of Priests and Prophets. These cultivated the sciences, chiefly the occult ones, magic, and the like. Nearest to the Sacred Literature stands Didactic Poetry, somewhat related to the Orphic, whose chief representatives are Sido, Jopas, &c. The erotic poetry is characterised as of a very sensuous nature, both in P. and the colonies. Of historians are mentioned Mochus, Hysikrates (Sanchuniatho?), Theodotus, Philostratus, Menander, and others; but these are mere Greek versions of

their Phœnician names, and absolutely nothing has been preserved of their writings. Punic literature is also frequently mentioned by Greek and Roman writers. Geography, history, agriculture, were the fields chiefly cultivated by the colonists of Carthage and the West generally.

The monuments that have come down to us, and which not only have enabled us to judge for ourselves of the religion, the language, and the manners of the Phœnicians, are of twofold kind—they are either legends on coins and lapidary inscriptions, or Phœnician proper nouns and texts imbedded in the works of ancient classical or sacred writers. The principal and ever-growing source for our information, however, are the monumental inscriptions, of whose existence, till the middle of the 18th c., nothing was known. The most numerous Phœnician remnants have been discovered in the colonies. Richard Pococke first found, on the site of ancient Citium (Larnaka of to-day), 31 (not 33, as generally stated) Phœnician inscriptions, which he deposited at Oxford (published by Swinton, 1750). Malta, Sardinia, Carthage, Algiers, Tripolis, Athens, Marseille, have each yielded a considerable number, so that altogether we are now in the possession of about 120 monuments, either votive tablets, or tomb inscriptions. The latest and most remarkable are those now in the British Museum, discovered at Carthage a few years ago by N. Davis, consisting of votive tablets, a (doubtful) tombstone, and a sacrificial tariff, which completes another stone found some years ago at Marseille of the same nature; both setting forth the amount of taxes, or rather the proportionate share the priest was entitled to receive for each sacrifice. Another exceedingly valuable (trilingual) inscription, referring to the gift of an altar vowed to Eshmun-Aasklepios, has been discovered a year or two ago in Sardinia. See below. One of the most important historical monuments is the sarcophagus of Ashmanasar II., king of Sidon (son of Tennes?), found at Tyre in 1855, the age of which has variously been conjectured between the 11th c. B.C. (Ewald)—a most incongruous guess indeed—the 7th (Hitzig), the 6th (Duc de Luynes), and the 4th (Levy), of which we shall add the commencement, literally translated: 'In the month of Bul, in the fourteenth year that I reigned, King Ashmanasar, king of the Sidonians, son of King Tebenth, king of the Sidonians—spake King Ashmanasar, king of the Sidonians, saying: Carried away before my time, in the flood of days—in dumbness ceases the son of gods. Dead do I lie in this tomb, in the grave, on the place which I have built. I myself ordain that all the nobles and all the people shall not open this place of rest; they shall not seek for treasures and not carry away the sarcophagus of my resting-place, and not disturb me by mounting the couch of my slumbers. If people should speak to thee [and persuade thee to the contrary], do not listen to them. For all the nobles and all the people who shall open this sarcophagus of the place of rest, or carry away the sarcophagus of my couch, or disturb me upon this resting-place, may they find no rest with the departed; may they not be buried in a tomb, and may no son and successor live after them in their place;' &c.

The votive tablets bear the same character throughout, differing only with respect to the name of the man or woman who placed it in a certain sanctuary in accordance with his or her vow. Their material is mostly limestone or fine sandstone, rarely marble, and they vary from 5 to 15 inches in height, from 4 to 7 in width, and from 1½ to 4 in thickness. Beginning in most cases with the dedication to the god or goddess, or both, thus: '[Sacred] To the god . . . [this tablet]

Carthaginian votive tablets with which the British Museum (now the wealthiest in Phœnician monuments) has lately been enriched, as mentioned before.

The emblems on it are symbolical, and refer to the deities invoked. The lower part is mutilated, but easily supplied. The date is uncertain, perhaps the 2d or 3d c. B.C.

The second is a trilingual inscription from a base of an altar, recently found at Pauli Gerrei, in Sardinia, and has been first fully explained by Deutsch. (See *Transactions of the Royal Society of Literature*, 1864.)

Its contents are briefly this: A certain Cleon, Phœnician by religion, Greek by name, Roman by nationality, a salt-farmer, vows an altar—material and weight of which are only given in Phœnician; viz., copper, a hundred pounds in weight—to Eshmun-Æsculapius 'the Healer' (the Phœnician *Mearrach*, clumsily transcribed *Merre* in Latin, and *Mirre* in Greek), in consideration for a cure to be performed. The date, given in Phœnician, viz., the year of two, apparently annual, entirely unknown judges, gives no clue to the time. Palæographical reasons, however, would place it in about the 1st c. B.C.

Among those who have more or less successfully occupied themselves with Phœnician antiquities, language, and literature, and who have also, in some instances, deciphered inscriptions, we mention Scaliger, Bochart, Pococke, Barthélemy, Swinton, Bayer, Dutens, Hamaker, Gesenius, Movers, Munk, Judas, Barges, De Saulcy, Ewald, Levy, Vaux, Renan, De Luynes, De Vogüé, Deutsch, and others; to whose writings, contained either in special works or scattered in *Transactions of learned societies*, we refer for further information on the subject of our article. The principal work in German is Movers's *Phœnicier*, unfortunately left unfinished at the author's death. A useful English compilation is Kenrick's *Phœnicia* (Lond. 1855).

PHENICOPTERUS. See FLAMINGO.

PHœ'NIX, the name of a mythical Egyptian bird, supposed by some to be a kind of plover, like the *kibitz*, often depicted with human arms, and called in hieroglyphs *rekh*. Others consider it to be the *bennu*, or *nycticorax*, a bird sacred to Osiris, and represented watching in the tamarisk over his coffin. The first of these representations has sometimes a star upon the head, supposed to indicate the astronomical period of its appearance. It visited Egypt after the death of its father, and entered the shrine particularly dedicated to it at Heliopolis, and there buried its parent, putting the body into an egg or case made of myrrh, and then closing up the egg. Another account is, that the P., when about to die, made a nest for itself in Arabia, from which a new P. sprung of itself. This bird proceeded to Heliopolis, and there burned and buried its father. But the more popularly-known version is, that the P. burned itself, and a new and young P. sprung from the ashes. A less received version is, that a worm crawled out of the body of the dead P., and became the future one. The P. was, according to the most authentic accounts, supposed to visit Egypt every 500 years; the precise period, however, was not known at Heliopolis, and was a subject of contention till its appearance. The connection of the Phoenix period with that of the Sothic cycle, appears to be generally received by chronologists, as well as the statement of Herodotus, that it designated the soul and the inundation of the Nile. A great difference of opinion has prevailed about the Phoenix period: according to Ælian, it was a cycle of 500 years; Tacitus seems to make it one of 250 years; Lepsius, a cycle of 1500 years. The P. was fabled to have four times appeared in Egypt: 1, under Sesostria; 2, under Amasis, 569–525 B.C.; 3, under Ptolemy

Philadelphus, 284–246 B.C.; and lastly, 34 or 36 A.D., just prior to the death of Tiberius. The P. also appears upon the coins of Constantine, 334 A.D., viz., 300 years after the death of Christ, who was considered the P. by the monastic writers. It is supposed by the rabbins to be mentioned in Job, vi. 18; the Psalms—Job xxxix. 18; Psalms ciii. 5; Herodotus, ii. 73; Achilles Tatius, iii. 25; Tacitus, A.D. vi. 28; Tzetzes, *Chil.* v. 397; Lepsius, *Einleit.* p. 183; *Archæologia*, vol. xxx. p. 256.

PHœNIX. See DATE PALM and PALME.

PHO'LAS, a genus of lamellibranchiate molluscs of the family *Pholadidae*. This family, to which the Ship-worm (*Teredo navalis*) also belongs, has the shell gaping at both ends, thin, white, very hard, sometimes with accessory valves; the two principal valves beset with calcareous inequalities, connected by fine transverse parallel ridges, forming a kind of rasp, used by the animal for boring a hole in wood, or other substance, in which it lives. The animal itself is either club-shaped (as in *Pholas*) or

A piece of rock bored by *Pholades*.

worm-shaped (as in *Teredo*), with large long siphons often united almost to the end, and a short foot. Several species are natives of the British coast. They are popularly called *Piddocks*. They are used for bait, and also for food. How the pholades or piddocks excavate the holes in which they live, sometimes in clay or mud, but often in chalk, and even in much harder rocks, has been the subject of much dispute. An excavating instrument armed with silicious particles, has been ascribed to the animal, but no such instrument exists. The shell is studded with projections, in regular rows, giving it the character of a rasp or file; and the P., fixing itself firmly by its foot, which acts as a sucker, and working itself, from side to side, makes use of the rasping power of its shell to enlarge its hole as it has need, so that the hole is always very exactly accommodated to the size of the occupant.

PHONETIC WRITING is the representation of speech by means of symbols for the elementary sounds of language. All alphabetic writing is essentially phonetic. The invention of letters was the invention of phonetic writing, as distinguished from the older pictorial, or ideographic, writing. From a variety of causes, however, no language has ever been perfectly represented by its spelling, and with the lapse of time the divergence has gone

our compound sounds, such as those heard in the words *chair, queen, tune, I, out, &c.* Any attempt, therefore, at representing compounds analytically would be premature, until the analysis of the compounds had been settled. This analysis would be absolutely necessary for a general alphabet, but not so for an alphabet for any single language. Phonetic writing, then, should be separately considered, as a means of representing the elementary sounds of all languages, and as a method of symbolising the pronunciation of any one language only. We shall now shew the nature of the attempts that have been made for the phonetic writing of English.

Dr Franklin, in 1768, proposed a phonetic alphabet for English, in which new symbols were introduced for the vowels heard in the words *on* and *up*, and the four consonants heard in the words *she, they, and thing*. Many other schemes have been from time to time proposed; but the only alphabets which have been practically applied on a large scale are those of Dr Comstock in America, and Messrs Ellis and Pitman in England. The object of experimenters in this department has generally been to make use of existing letters as far as possible, and only to supplement deficiencies by new forms. The common alphabet has been made to furnish almost a sufficient number of characters by the inversion of some of its letters—thus, *A, Δ, ε, o, e, S, y, &c.*, as in the 'Anti-absurd' alphabet of Major Beniowski; but the best scheme of phonotypes that has yet been introduced was the joint production of Mr Isaac Pitman, the inventor of the first system of phonetic shorthand writing, and Mr A. J. Ellis, B.A. of Cambridge, a most accomplished mathematician and linguist. This alphabet was completed in 1847; and the experiment of its introduction was carried out with great diligence and perseverance by its promoters, until an army of philanthropic assistants became enlisted in all parts of Great Britain and America. Primers and school-books were issued, and tested on juvenile and adult classes; many works of standard literature, and even the entire Bible, were translated into the new spelling; magazines were published, and ultimately a newspaper, printed in the phonetic character, was started by the enterprising orthographic reformers. In this scheme of phonotypes, diphthongal and articulate compounds were not analysed, and the letters of the ordinary alphabet were retained in their most common signification, seventeen new characters being introduced for unrepresented or ambiguously written sounds. The forms of these were, in most cases, happily suggestive of the displaced orthography, and the general aspect of the writing bore such a resemblance to common typography, that any good reader of the latter could decipher the new printing with ease, after a very brief study of the alphabet. The ordinary vowel letters (*A, E, I, O, U*) were pronounced as in the words *am, ell, ill, on, up*; the consonants *C* and *G* were sounded as in *came* and *game*; the letters *K, Q, X* were rejected as superfluous, and all the other letters of the common alphabet were retained, with their established sounds. Comparing this scheme of letters with the tabulated elementary sounds of English, we find that it represents all the vowels, except the nice varieties heard in the words *air, ore, err, ask*; and that all the consonants are accurately represented except *wh*. The latter element is written by letters sounding *hoo*, so that the words *where* and *who'er* are made identical to the eye; and the sentence, 'I saw the man *whet* the knife,' is written, 'I saw the man *who* ate the knife.'

Notwithstanding these imperfections, this alphabet was found to work well among those who were disposed for a reform. The phonetic method was

proved to be remarkably simple and easy in comparison with the ordinary system; the time occupied in making fluent readers was greatly reduced; and readers of phonetic printing experienced but little difficulty in the transition to reading from common orthography.

The advantages claimed for the system were chiefly: rapidity of learning to read, certainty of pronunciation, and increased facility in common reading, after the power of phonetic reading had been acquired. The chief disadvantages alleged against the system were: accustoming the eye to a false orthography, and teaching what had to be in great part unlearned after it was acquired. Whether the objections were right or wrong, they were overpoweringly numerous, and the system failed to do more than prove that phonetic spelling greatly simplifies the acquisition of the power of reading.

The original phonotypic alphabet, described above, has been for some years discarded in the printing issued from the 'Phonetic Institution' (Bath), and a more analytic alphabet has been adopted, in which *eleven*, instead of *seventeen*, new forms are introduced. The latest edition of this alphabet gives the ordinary vowel letters *A, E, I, O* for the sounds in the words *am, ell, ill, on*, and the letter *U* for the sound in *pull*; *K* is restored, and *C* rejected; *J* is used as in French; and the elementary sound of *wh* is still unacknowledged. The eleven new characters represent the consonants in the words *she, oath, they, and (s)ing*; and the vowels in the words *ale, cel, alms, old, ail, pool, up*.

The following are the forms of the new letters as printed and written, with a passage exhibiting their appearance in composition.

This Phonetic Alphabet consists of 34 letters, viz. the 23 useful letters of the common alphabet (*c, q, and x* being rejected), and the 11 new ones below. *J* is used for the French *j* (*zh*), or *g* in 'edge' or *s* in 'vision'; hence *dj* represents *J* in *John*, and *dg* in *edge*. *Tg* (*t sh*) represents *ch* in *cheat*, and *teh* in *catch*. *Y* and *w* are consonants; *wh* being replaced by *hw*. The vowels *a, e, i, o, u* have invariably the short sounds heard in *pat, pet, pot, put*. All the other old letters have their usual signification. The italic letters in the words in the third line denote the sounds of the letters.

VOWELS.

A a E e I i O o U u — J j
als, age, air, eat — all, ope, food — son, bet,
ams, edj, er, it — ol, op, food — son, bet

DIPHTHONGS.

CONSONANTS.

si, ei, oi, ou.	||	C g, H b, F d, U p.
ai, ei, oi, ou	||	<i>g, h, b, d, p</i>
ay, hy, boy, now.	||	<i>she, thin, then, sing.</i>
ai, bei, boi, nou.	||	<i>ci, bin, den, sip.</i>

The double letter *u*, as in *unit, unite, duty, value*, is written thus: "yunit, yunait, diunit, valiu." When *ui* or *uiu* make a dissyllabic dipthong, the second letter is marked with a diacresis; thus, *sofaiy, scig*.

"Tiz de meind dat maks de bodi rit;
 and az de sen breks bru de darkest kloeds,
 so onor 'pireb in de minest habit.
 † Hwot! † is de dje mor proqs dan de lara,
 bikos his feders ar mor biutiful;
 or † is de ader beter dan de il,
 bikos his pented skin kontents de el.
 † no, gud Ket; neider at dou de wrra
 for dis pur farnitiur and min ara."

and forming a 'visible speech.' See **VISIBLE SPEECH**. Phonetic writing on such a basis would not encounter the prejudices that have hitherto defeated the efforts of orthographic reformers; and it would be of considerable immediate service to linguists, besides being a beginning and a promise of the widest utility. For phonetic shorthand writing, see **SHORTHAND**.

PHONOMANIA. See **HOMICIDAL MANIA**.

PHOSGENE GAS, known also as **OXYCHLORIDE OF CARBON** or **CHLOROCARBONIC ACID**, is represented by the formula COCl_2 , or more correctly by its double $(\text{COCl})_2$. It is a colourless, suffocating gas, which is formed by exposing equal measures of carbonic oxide and chlorine to the direct action of the sun, when they combine and become condensed into half their volume. It does not possess any acid characters, but water decomposes it into carbonic and hydrochloric acids, as is shewn by the equation $(\text{COCl})_2 + 2\text{H}_2\text{O} = 2\text{CO}_2 + 2\text{HCl}$. This gas is of great interest in relation to the artificial production of Urea (q. v.) from inorganic matter.

PHOSPHATES (in Physiology). The following phosphates* play an active part in the chemistry of the animal body.

Phosphate of Soda, which may occur under any one of the three forms $3\text{NaO}, \text{PO}_5$, or $2\text{NaO}, \text{HO}, \text{PO}_5$, or $\text{NaO}, 2\text{HO}, \text{PO}_5$. All these salts are soluble in water; and the first two have an alkaline reaction, while the third is acid. By exposure of the second of these salts ($2\text{NaO}, \text{HO}, \text{PO}_5$) to a red heat, it is converted into what is termed *pyrophosphate of soda* ($2\text{NaO}, \text{PO}_5$), in which the phosphoric acid is obviously no longer tribasic, but bibasic; and by similarly treating the third of these salts ($\text{NaO}, 2\text{HO}, \text{PO}_5$), we convert it into the so-called *metaphosphate of soda* (NaO, PO_5), in which the phosphoric acid is monobasic. It is in consequence of these changes under the action of heat, that the terms *pyrophosphoric* and *metaphosphoric* have been used as synonyms for *bibasic* and *monobasic phosphoric acids*. Phosphate of soda, in one or other of the above forms, occurs as a constituent of all the animal fluids and soft tissues of the body, but is especially abundant in the urine and the bile. There are reasons for believing that it is the second and third of these salts which occur as constituents of the animal body, although the first may possibly sometimes be found. Pyrophosphate and metaphosphate of soda are often found in the ashes of animal fluids or tissues after the process of incineration, but they merely result from the action of heat on the two other salts. The following remarks on the derivation, elimination, and physiological importance of the phosphate of soda, are equally applicable to the corresponding salts of potash, which are always associated with them. The phosphates of the alkalies, which occur in the animal body, obviously owe their origin, either directly or indirectly, to the food; viz., directly, by being ingested as phosphates of the alkalies; or indirectly (within the system), by the action of phosphate of lime on salts of the alkalies. The elimination of these salts from the system is necessary, because they are being constantly supplied by the food; and this process is effected mainly by the kidneys and the intestinal canal. In the carnivorous animals, whose blood is much richer in phosphates than that of herbivora (the ash of the blood of the dog, for example, contains from 12 to 14 per cent. of phosphoric acid, while that of the ox or

sheep does not contain more than from 4 to 6), these salts are carried off by the urine; but in consequence of the formation of free acids as products of the disintegration of the tissues, a portion of the base is abstracted from the originally alkaline phosphates, and a corresponding portion of phosphoric acid is liberated. The originally alkaline salt is thus rendered neutral or even acid; and the occurrence of the acid phosphate of soda, $\text{NaO}, 2\text{HO}, \text{PO}_5$, in the urine is thus explained. In the herbivorous animals, on the other hand, the urine contains no phosphates, the whole of the phosphoric acid taken in their food being eliminated by the intestinal canal in the form of the insoluble phosphates of lime and magnesia. Although the general distribution of the phosphates of the alkalies in the nutrient fluids (there is 40 per cent. of them in the ash of the blood-cells; 28.4 per cent. of phosphoric acid and 23.5 of potash in the ash of cow's milk; and about 70 per cent. of phosphoric acid in the ash of the yolk of egg) is in itself an indication of their importance, the exact nature of their functions is not completely understood. Liebig has specially drawn attention to the peculiar grouping of the acid and alkaline fluids of the animal body. The permanence of this grouping is chiefly maintained, especially in herbivorous animals, by the conversion, within the body, of alkaline and neutral phosphates into acid phosphates by the means already described. Moreover, all tissue-forming substances (the protein bodies) are so closely connected with phosphates, that they remain associated during dissolution and subsequent re-precipitation of these substances; and the ash of developed tissues (such as muscle, lung, liver, &c.) always affords evidence that acid phosphates existed in the recent tissue; and, further, no exudation from the blood-vessels can undergo transformation into cells and fibres, or, in other words, become organised, unless, in addition to other conditions, phosphates are also present. Another very convincing proof of the share taken by the phosphates in the formation and functions of the tissue, is the fact, that although herbivorous animals take up a very small quantity of phosphates in their food, and although their blood is very poor in these salts, their tissues contain as large a proportion of phosphates as the corresponding parts of carnivora. Lastly, the fact, that one equivalent of the alkaline phosphate of soda ($2\text{NaO}, \text{HO}, \text{PO}_5$) possesses the property of absorbing as much carbonic acid as two equivalents of carbonate of soda, leads us to the belief, that the power of attracting carbonic acid, which the serum of the blood possesses, is due at least as much to the phosphate as to the carbonate of soda, and that, consequently, phosphate of soda plays an important part in the respiratory process.

Phosphate of Lime occurs in the organism in two forms, viz., as the neutral or basic phosphate, $3\text{CaO}, \text{PO}_5$, and the acid phosphate, $2\text{CaO}, \text{HO}, \text{PO}_5$. The neutral phosphate occurs in all the solids and fluids of the body, but is most abundant in the bones, in which it amounts to about 57 per cent.; and in the enamel of the teeth, in which it ranges from 80 to 90 per cent. It may at first sight appear inexplicable how a salt so perfectly insoluble in water as neutral phosphate of lime, can be held in solution in the animal fluids. In some fluids, as the blood, it is probably, in part at least, combined with albumen, with which it forms a soluble compound; while in other fluids, as the urine, it is held in solution by a free acid or by certain salts (as, for example, chloride of sodium), whose watery solutions are more or less able to dissolve it. If any proof is wanted of the functions of this salt in relation to the bones, it is afforded by the well-known experiment

* The means of distinguishing between the salts of tribasic, bibasic, and monobasic phosphoric acid, are given in the article **PHOSPHORUS**.

for the purpose, called a *phosphoroscope*. The body to be tried is placed in a small drum, which has an opening at each end. In this drum there revolve two discs, mounted on the same axle, and pierced symmetrically with the same number of holes. They are so adjusted, that when a hole in one disc is opposite to the hole in the corresponding end of the drum, the second disc closes the hole at its end of the drum, and *vice versa*. Light is admitted by one of the holes in the drum, so as to fall on the object, and it is examined through the other hole. It is obvious that when the discs are made to revolve, the object is alternately exposed to light, and presented to the eye. By a train of multiplying wheels, these alternations may be made to succeed each other as rapidly as the observer pleases, and thus the object is presented in the dark to his eye as soon after its exposure to light as may be desired. Almost all bodies are found to be phosphorescent; for instance, some kinds of pink rubies, when exposed to sunshine in this apparatus, appear to glow like live coals in the dark. The phenomenon is, in fact, precisely that which was observed by Brewster and Herschel in quinine and certain crystals of fluor-spar, and thence called *Fluorescence*. Stokes was the first to give the true explanation of these facts, and he shewed it to depend upon the change of refrangibility (i. e., colour) which light suffers on being absorbed and then radiated by the fluorescent substance. The green colouring-matter of leaves, a decoction of the bark of the horse-chestnut, and the common *canary glass* (coloured with oxide of uranium), are bodies which exhibit this phenomenon very well. Perhaps the most striking method of studying the phenomenon is to receive in a darkened room the solar Spectrum (q. v.) on a sheet of white paper; and to pass over the coloured spaces a brush dipped in a solution of sulphate of quinine with sulphuric acid. No change is produced on the less refrangible rays, but in the blue and indigo spaces, a strange change of colour is at once apparent where the liquid has been spread. This appears more strongly in the violet, and vividly in the spaces beyond the violet, where rays fall which excite no luminous sensation in the eye. By this experiment, the visible length of the spectrum may easily be doubled. By using the electric light, which is peculiarly rich in these highly refrangible rays, a prism of quartz, which allows them to pass very freely, and various fluorescent substances, Stokes has obtained spectra six or eight times as long as those otherwise visible. The characteristic of all these rays is, that they are *less* refrangible than those from which they are produced. The entire phenomenon is identical in principle with Leslie's photometer, in which light was measured when changed into heat by absorption, in the coloured glass of which one of the bulbs of his differential thermometer was formed.

Ordinary phosphorus (from which the phenomenon took its name) becomes luminous in the dark by slight friction; whence the common trick of drawing self-luminous figures on doors and walls with a stick of phosphorus, or an ordinary lucifer-match. A similar appearance is presented by putrescent animal matter, such as decaying fish, &c.; but these are effects of slow combustion, or chemical combination, and are not properly classed among the phenomena of phosphorescence. See LUMINOSITY OF ORGANIC BEINGS.

PHOSPHORUS (symb. P, equiv. 31, sp. gr. 1.826) is one of the metalloids, or non-metallic elements, although, in its combining relation, it is more closely connected with the metals arsenic and antimony than with any of the members of the sulphur-group, in which it is commonly placed.

This substance affords an excellent example of allotropy; that is to say, it may be made to occur under different forms presenting different properties. See ALLOTROPY.

Ordinary phosphorus and the red variety are the only important forms. We shall speak of them as phosphorus and red phosphorus respectively.

Phosphorus at ordinary temperatures is an almost colourless or faintly yellow solid substance, having the glistening appearance and the consistence of wax, and evolving a disagreeable alliaceous odour, which, however, is probably due to the action of the oxygen of the air upon it. It fuses at 111.5° into a colourless fluid; and if the air be excluded, it boils at 555°, and is converted into a colourless vapour of sp. gr. 1.826. If, however, it be heated to about 140° in the air, it catches fire, burns with a brilliant white flame, and is converted into phosphoric acid; and, indeed, it is so inflammable that it will catch fire at ordinary temperatures by mere friction. As the burns which it occasions are often severe and dangerous, great caution is required in handling it; and in consequence of the readiness with which it catches fire, and of its tendency to oxidise when exposed to the air at a temperature higher than 32°, it is always kept in water, in which it is insoluble. It is slightly soluble in ether, but dissolves freely in benzol, in the fixed and essential oils, and in bisulphide of carbon; and by allowing its solution in one of these fluids to fall upon filtering paper, the finely divided phosphorus absorbs oxygen so rapidly as spontaneously to catch fire as soon as the solvent has evaporated. One of the most characteristic properties of phosphorus is that it shines in the dark, probably from the slow combustion which it undergoes; and hence its name from the Greek words *phōs*, light, and *phōros*, bearing. Its power of forming ozone is noticed in the article on that substance. Taken internally, phosphorus is a very powerful irritant poison; and it is the active ingredient of some of the preparations employed for the destruction of vermin. Its fumes give rise to a peculiar form of necrosis of the jaw, which is very common amongst the makers of lucifer-matches, and is not followed, as in ordinary necrosis, by a formation of new bone.

Red phosphorus differs from the ordinary variety in several important points. It occurs as a deep red amorphous powder, which is perfectly devoid of odour, may be heated to nearly 500° without fusing, has a specific gravity of 2.10, does not shine in the dark, nor take fire when rubbed, undergoes no change on exposure to the air at ordinary temperatures, and is in all respects far less inflammable. Moreover, it is insoluble in bisulphide of carbon and the other fluids in which ordinary phosphorus dissolves, and is not poisonous. On this account, Schrötter (to whom we are mainly indebted for our knowledge of this modification of phosphorus) has attempted, although with imperfect success, to apply it to the formation of lucifer-matches. When red phosphorus is heated in an atmosphere of carbonic acid to a temperature of 500°, it is converted, without loss of weight, into ordinary phosphorus.

Phosphorus is never met with in nature in an uncombined state, but it occurs in small proportion as phosphate of lime in the primitive and volcanic rocks (as was first shewn by Fownes in 1844), by the gradual decay of which it passes into the soil; it is also found abundantly in the minerals known as *apatite* and *phosphorite*, and in the brown rounded pebbles which abound in the Norfolk Crag, and which, under the name of *codrolites*, are much employed, when crushed, for manure. From the soil, it is extracted by plants, which accumulate it

upon it by different rays in the solar spectrum. His words are these (published in 1777): 'Fix a glass prism at the window, and let the refracted sunbeams fall on the floor; in the coloured light put a paper strewn with *luna cornea*, and you will observe that the horn silver grows sooner black in the violet ray than in any of the other rays.' Still more recently, the names of Wedgwood and Davy (1802), and of Niepce and Daguerre from 1814 to 1839, occur as followers in the path indicated by Scheele and the earlier savans; and in the early months of the present year (1864), the attention of the Photographic Society of London was occupied by the endeavour to establish the authenticity and true photographic character of some pictures found in the library of Matthew Boulton, and believed to be true sun-pictures by James Watt, the celebrated engineer; thus offering great probability that the mind which produced the wonders of steam-power, had also been engaged in the same investigations which have resulted in the present more extensive development of photographic science. Most of the experiments alluded to may be said to have been based upon the fact, that the salt of silver, called by the ancients *luna cornea*, and by modern chemists nitrate of silver, otherwise lunar caustic (from its use in medicine), is highly sensitive to the influence of light. But such observers must have been fully aware that this substance is not the only one affected by light, for it had been long noticed that the light of the sun does not fall upon any surface without leaving traces of its action thereon. It cannot be absorbed or reflected without in some way modifying the structure and properties of the exposed surface. Even the brick and stone of which our houses are built become blanched by its influence, and those portions on which the shadows of trees or other detached objects fall are perceptibly darker than those exposed to its full force; with the knowledge, therefore, of this all-pervading influence before their minds, the investigations of scientific photographers have been directed to the production of surfaces either of metal, paper, or glass, so imbued with chemical substances as to possess a maximum amount of sensibility to this subtle agent—light.

There seems but little doubt that some of the acute-minded men who investigated the phenomena of the influence of light must have made use of the beautiful invention of Baptista Porta of Padua, known as the Camera Obscura (q. v.); for the pictures of natural objects formed on the inner surface of this instrument would readily suggest its use in combination with the *luna cornea*. We know that, in the later period of the researches made on the subject, the camera was used, and that it has now been universally adopted. The earlier attempts to produce pictures by its means failed, however, in consequence of the want of a power of fixing the images produced by the lens. That want having, by means of chemical investigation, been supplied, the science of photography has become firmly established in its principles, and the practice of it as an art is diffused all over the civilised world. The honour of having been the first to produce pictures by the action of light on a sensitive surface is now very generally conceded to Thomas Wedgwood, an account of whose researches was published in 1802 in the *Journal of the Royal Institution*, under the title: 'An Account of a Method of copying Paintings upon Glass, and of making Profiles by the agency of Light upon Nitrate of Silver; with Observations by H. Davy.' In the experiments detailed in this communication, white paper and white leather were imbued with nitrate of silver, and exposed either in the camera obscura,

or under the leaves of trees or wings of insects. The result was, that the shadows preserved the parts concealed by them white, while the other parts became speedily darkened. The misfortune was, that no attempts made either by Wedgwood or Davy to prevent the uncoloured portions from being acted on by light (or, as we now say, to fix the picture), were successful. This operation was not effected in a thoroughly efficient manner until Sir John Herschel suggested the employment of hyposulphite of soda for that purpose. Many other fixing agents had been previously used, as ammonia, iodide of potassium, chloride of sodium, and bromide of potassium, suggested by Mr Fox Talbot; none of these, however, were found equal to the salt proposed and successfully used by Sir John Herschel.

M. Niepce of Chalon-on-the-Saône was the first to enjoy the satisfaction of producing permanent pictures by the influence of solar radiations. This was accomplished in 1814, and the name chosen to designate his process was heliography—a name in some respects preferable to photography. It consisted in coating a piece of plated silver or glass with a varnish made by dissolving powdered asphaltum to saturation in oil of lavender, taking care that the drying and setting of this varnish be allowed to take place in the entire absence of light and moisture. The plate so prepared was then exposed in the camera obscura for a length of time, varying from four to six hours! according to the amount of light. A faint image only is at first visible, and this is afterwards developed and fixed by immersion in a mixture of oil of lavender and oil of white petroleum; the plate being finally washed with water, and dried. Light has little or no action on these heliographs; they should, however, be protected from moisture. M. Daguerre improved on this process, by suggesting the use of the resins obtained by evaporating oil of lavender, whereby a great increase of sensibility was secured.

Adopting date of publication as the best evidence of discovery, the next process offering itself for consideration is that for photogenic drawing by Mr Henry Fox Talbot, communicated to the Royal Society on the 31st January 1839, just six months previous to the publication of Daguerre's process. It consisted in immersing carefully selected writing-paper in a weak solution of common salt, and drying it. After this, a dilute solution of nitrate of silver was spread over one side, and the paper again dried at the fire. When dry, it was fit for use, the sensitiveness being much increased by alternate treatment with saline and argentine solutions. Paper thus prepared yielded impressions in an incredibly short time, and nothing could be more perfect than the images it gave of leaves and flowers, the light passing through the leaves delineating every ramification of their nerves. Considerable improvement in point of sensibility was attained by Mr Talbot in the following year, 1840, by the employment of iodide of silver on paper, as a foundation, to be washed over with a mixture of aceto-nitrate and gallo-nitrate of silver, just previous to exposure in the camera. Paper so prepared was so sensitive that an exposure of less than a second to diffused light was enough to produce an impression. After exposure and development, the picture was washed, and fixed by immersion in a solution of bromide of potassium.

Niepce and Daguerre accidentally discovered that they were conducting experiments of a kindred character, and shortly afterwards entered into a partnership. The former, however, dying in July 1833, a new deed of partnership was signed between

PHOTOGRAPHY.

surface, and allow the film to dry in the absence of light. A number of sensitive plates can be prepared by this method in anticipation of a journey. This is called the 'Dry Collodion Process.' A plate so prepared is much inferior in point of sensitiveness to a wet plate, and this arises as much from an altered molecular condition of the iodide of silver as from the absence of free nitrate of silver. The Abbé Despratz introduced resin into his collodion, with the view of keeping the pores open. The pictures obtained by his process were, however, difficult to develop without stains; and a variety of agents have since been used, both from the organic and inorganic kingdoms, to preserve the film in the same molecular condition when dry as when wet. Among these may be mentioned nitrate of magnesia, honey, oxymel, and a host of other materials, such as sugar, albumen, infusion of malt, and lastly tannin, which last preservative agent bids fair to supersede all others.

The practice of photography in the present day is confined almost exclusively to the POSITIVE, the NEGATIVE, and the DRY COLLODION PROCESSES. In the *first*, the object is to obtain in the camera a direct image, which is to be viewed by reflected light; and as it is desired that the pictures so produced should possess pure blacks and whites, an inorganic (nitric) acid is used in the bath, and the developer—protosulphate of iron—is also of inorganic origin, these being the conditions best calculated to produce a deposit of pure white metallic silver. In the *second*, however, an image possessing density to transmitted light is required; accordingly, an organic (acetic) acid is used both in the bath and developer; and in order still further to insure an efficient supply of organic matter to combine with the silver at the moment of its reduction, pyrogallol acid is sometimes exclusively used. The *third* or dry process is distinguished from the preceding modifications of the wet process by the complete removal of the adherent free nitrate of silver, the application of a preservative agent, and the necessity for adding nitrate of silver to the developer.

It will be desirable, before concluding this article, to refer to some of the various applications of photography which have been made since the principles of the science have been well understood.

PHOTO-LITHOGRAPHY, the application of photography to engraving on stone. A lithographic stone is coated with a mixture of water, gum-arabic, sugar, and bichromate of potash, dried in the dark, exposed in the camera, or under a negative. The effect of the luminous action is to render the gum almost insoluble. A solution of soap is then applied, which serves the double purpose by its decomposition of yielding a greasy printing-surface, and by its solvent action to remove those portions unacted on by light: its action being inversely proportionate to the extent to which the gum was fixed by the light. In this condition, the stone is freely washed with water, and when dry, receives a coating of printer's ink from the roller, which, by uniting with the soap, gives additional body to the picture. This process was patented by Mr W. E. Newton; but, in common with others of a kindred character noticed in this section, the resulting pictures were invariably deficient in middle tint, possessing a degree of hardness very unpleasant to the eye, and satisfactorily accounting for its not coming into general use.

PHOTO-XYLOGRAPHY, the application of photography to wood-engraving. One process, patented by Mr Newton, consisted, first, in rubbing into the wood-block a varnish, composed of asphaltum, ether,

and lamp-black, to saturate the pores. Collodion was then poured on as in the ordinary Collodion process (q. v.). The surface was then sensitised, and exposed in the camera, the picture being developed in the usual way. But the desired success was not complete, for the thickness of the united films was found to interfere with the operations of the engraver, and the process, in consequence, did not receive general adoption.

W. Crookes, F.R.S., subsequently simplified the method of producing an impression on wood-blocks, by rubbing them over with a mixture of oxalate of silver and water, and exposing under a negative. The advantage of this process was, that it did not require any treatment of the block for the purpose of fixing after exposure, as if kept from the continued action of light, the block would keep long enough for the engraver to work out the details with his tools. It is fair to assume, notwithstanding the ingenuity displayed in these processes, that some insuperable objection exists in both of them, since neither have been adopted to much extent.

PHOTO-MICROGRAPHY consists in the enlargement of microscopic objects, by means of the microscope, and the projection of the enlarged image on a sensitive collodion film. The manipulatory details are the same as in the Collodion process (q. v.), only that, on account of the delicate nature of the markings to be rendered, it is necessary to employ a collodion yielding what is termed a structureless film. The principle upon which the enlargement is effected is that of the conjugate foci. This branch of microscopic and photographic science has proved a useful aid in the study of the sciences of Botany, Physiology, and Entomology, by delineating, with unerring accuracy, woody fibre, ducts, starch granules, muscular fibre, blood discs, nerve papillae, &c. Among the numerous experimenters attracted by this interesting study, Dr Maddox is perhaps the only one who has attained to any renown; and by him, minute animalcules, all but invisible by unassisted vision, have been magnified to a superficial area of three square inches, in which the most delicate details have been faithfully preserved. By reversing the arrangement necessary for these enlargements of microscopic objects, it will be seen that minute photographs of engravings, or other objects, may be produced which would require a microscope for their inspection, and it has been suggested that in this way war despatches might be transmitted in the setting of a ring or breast-pin; and this is really by no means so difficult to accomplish as it may seem at first sight, since photographs no larger than a pin's head have been produced, including in that small space portraits of no less than 500 eminent men.

CELESTIAL PHOTOGRAPHY comprehends the application of photography to the automatic registration of celestial phenomena. The labourers in this field of scientific research have been numerous both in America and Europe; the name of Mr Warren de la Rue, however, stands out so prominently before all others, that in the limited space at command, it is scarcely necessary to do more than notice the leading facts established by his researches. Not the least interesting of these is the demonstration of the sphericity of the moon by means of the stereoscope and lunar photographs, also the determination of the nature of many of the more obscure markings on its surface, by which elevations are clearly distinguished from depressions. The facule or spots on the sun's surface have also been photographed, and examined stereoscopically, by which they have been found to arise from elevations of the outer regions of the photosphere. Photographs

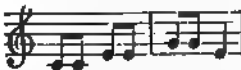
subsequent operation, which is performed in another chamber: any room which can be darkened will do. It consists in placing them in consecutive order on a

transparent screen, as in fig. 2. The modelling clay is so placed, rather behind the screen, that the artist can use a pantograph, which has its reducing point armed with a moulding or cutting tool instead of a mere marker; and as the longer arm of the instrument describes the outline of the projected figures obtained from the photographs, the shorter one is reproducing on a smaller scale the figure in the clay. The statuette thus produced requires retouching with the hand to remove the sharp and rugged lines of the cutting-tools, and of course much depends upon artistic skill in doing this. In the skilled hands which have yet had to do with its operations, the arrangement has had so marked a success as to promise to produce in time the most satisfactory results.

PHOTO-ZINCOGRAPHY. See **PHOTOGRAPHIC ENGRAVING.**

PHRAGMITES. See **REED.**

PHRASE, the name given, in Music, to the simple motives containing in themselves no satisfactory musical idea, which enter into the composition of every melody containing a perfect musical

idea, e. g.,  The phrase

most usually consists of two measures; in compound time, it may be comprised in one measure, and an extended phrase is one which contains three measures. In the more simple and regular forms of musical composition, two phrases unite to form a section ending in a cadence; and a perfect musical idea is formed of two such sections terminating, the first with the dominant, the second with the tonic harmony.

Fig. 2

vertical wheel, which is so arranged that at the will of the operator each one can be brought before the lens of a magic lantern, and its image projected on a



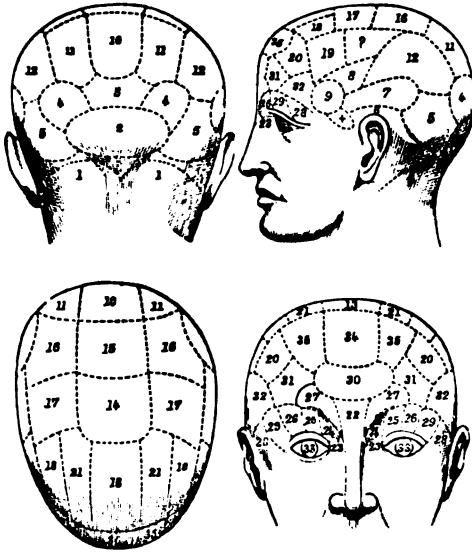
A little confusion has arisen from the use, by some musical writers, of the word phrase for what is here called a section.

PHRENITIS. See **MENINGITIS.**

PHRENOLOGY is a Greek compound signifying a discourse on the mind, but is used in a more limited sense to mean a theory of mental philosophy founded on the observation and discovery of the functions of the brain, in so far as it is concerned in intellectual and emotional phenomena. Phrenology takes into view likewise the influence of all other parts of the body, and of external agents affecting these, upon the brain.

The founder of this system was Dr Franz Joseph Gall (q. v.), who died in 1828. In Britain, it has been amply expounded by his pupil Dr Spurzheim (q. v.), by George and Andrew Combe (q. v.), by Dr Elliotson of London, and others. In America, Dr Charles Caldwell has been its ablest advocate. Gall's method of investigating the functions of the brain is that which, applied to other organs, has led to the discovery of their functions, but which had never before been systematically applied to the brain. When a physiologist wished to ascertain the function of any part of the body, he did not rest satisfied with examining its structure, and speculating on the purposes for which that structure seemed to be

The following is a representation of the human head in four points of view, shewing the positions of the cerebral organs, according to Mr Combe:



AFFECTIVE.

I.—PROPERTIES.

1. Amativeness.
2. Philoprogenitiveness.
3. Inhabitiveness or Concentrativeness.
4. Adhesiveness.
5. Combattiveness.
6. Destructiveness.
- [Alimentiveness.]
- [Love of Life.]
7. Secretiveness.
8. Acquisitiveness.
9. Constructiveness.

II.—SENTIMENTS.

10. Self-esteem.
11. Love of Approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit, or Ludicrousness.
21. Imitation.

INTELLECTUAL.

I.—PERCEPTIVE.

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Colouring.
27. Locality.
28. Number.

29. Order.
30. Eventuality.
31. Time.
32. Tune.
33. Language.

II.—REFLECTIVE.

34. Comparison.
35. Causality.

1. *Amativeness*, or sexual love, is believed to have for its organ the cerebellum; or at least a portion of it. As the basis of domestic life, this faculty is of great importance, and its regulation has ever been one of the prime objects of moralists and legislators.

2. *Philoprogenitiveness*, or love of offspring, is generally strongest in the female. Its organ is one of the easiest to distinguish in the human head. Those who are flat and perpendicular there, instead of being delighted, are annoyed by children. The feeling is said to give a tender sympathy with weakness and helplessness in general. The most savage races must have affection for their young, or they would become extinct. The organ, like the other cerebral parts, may become diseased; and insanity on the subject of children often occurs.

3. *Inhabitiveness* (called by Mr Combe *Concentrativeness*) has its organ immediately above the preceding. Dr Gall did not discover its function; and Dr Spurzheim, observing it large in persons attached to their native place, or any place in which they had long dwelt, called it *Inhabitiveness*. Mr Combe thought it has a more extended sphere

of action. He observed it large in those who can detain continuously their feelings and ideas in their minds; while the feelings and ideas of others pass away like the images in a mirror, so that they are incapable of taking systematic views of a subject, or concentrating their powers to bear on one point. The organ is stated as only probable, till further facts are obtained.

4. *Adhesiveness*.—The organ of this feeling was discovered by Gall, from being found very large in a lady remarkable for the warmth and steadiness of her friendships. It attaches men and gregarious animals to each other, and is the foundation of that pleasure which mankind feel in bestowing and receiving friendship, and in associating with each other. Acting with *Amativeness*, it gives constancy and duration to the attachment of the married. Generally speaking, *Adhesiveness* is strongest and its organ largest in woman.

5. *Combattiveness*.—Dr Gall discovered the organ of this propensity by a vast number of observations on the heads of persons fond of fighting. Dr Spurzheim extended its function to contention in general, whether physical or moral. Those deficient in it shew that over-gentle and indolent character which yields to aggression, is easily repelled by the appearance of difficulty and trouble, and naturally seeks the shades and eddy-corners of life.

6. *Destructiveness*.—The propensity to destroy is abundantly manifested by man and carnivorous animals, and when too strong or ill-regulated is the source of cruelty and wanton mischief. As a defensive power, it is of high utility. Anger, resentment, and indignation spring from it. A small endowment is one of the elements of a 'soft' character; while persons who have much of it are generally marked by an energetic, and probably fierce and passionate character.

Alimentiveness and *Love of Life*.—Some of the recent phrenological works treat in this part of the order of the faculties, of a faculty of *Alimentiveness*, or the propensity to eat and drink, and also of another which follows—viz., *Love of Life*. The first being represented as no more than *probable*, and the second as only *conjectural*, they have no number allotted to them on the bust. The place assigned to *Alimentiveness* is marked by a cross at the side-view of the bust. Mr Combe suggests that the organ of the *Love of Life* is probably a convolution at the base of the middle lobe of the brain, the size of which cannot be ascertained during life.

7. *Secretiveness* is the propensity to conceal, which in excess assumes the form of cunning. It helps animals both to avoid and to prey upon each other. In abuse, it leads to lying, hypocrisy, and fraud, and with *Acquisitiveness* disposes to theft and swindling. The organ is subject to disease, and cunning madmen are difficult to deal with. Disease here often leads to belief in plots and conspiracies formed against the patient.

8. *Acquisitiveness*.—The existence of a cerebral organ for the desire of property is held by phrenologists to prove that this is not, as many have thought, a derived or secondary tendency. It is what Lord Kames calls the 'hoarding appetite.' This explains the miser's desire to accumulate money, without regard to its use in the purchase of other enjoyment. When the organ is diseased, persons in easy circumstances are sometimes prone to pilfer everything of value, and often of no value, which comes in their way.

9. *Constructiveness* is the impulse to fashion and construct by changing the forms of matter. Many of the inferior animals possess it, as the bee, the bird, and the beaver. Physical nature consists of raw

those which make us acquainted with things that exist, and with their qualities and relations. Dr Spurzheim divided them into three genera—1. The External Senses; 2. The Internal Senses, or Perceptive Faculties; 3. The Reflecting Faculties.

The external senses, as generally received, are five in number—*Touch, Taste, Smell, Hearing, and Sight*. There seem to be two more—namely, the *Sense of Hunger and Thirst*, and the *Muscular Sense*, or that by which we feel the state of our muscles as acted upon by force and resistance. Without this last sense, we could not keep our balance, or suit our movements to the laws of the mechanical world. Whether each sense has a special cerebral organ in addition to its external apparatus and nerves, is a question regarded by phrenologists as still undetermined.

22. *Individuality*, the first in the list of the perceptive faculties, is not easily defined. It is said to take cognizance of individual objects as such, e.g., a horse or a tree. Other knowing faculties perceive the form, colour, size, and weight of the horse, but Individuality is thought to unite all these and give the idea of a horse. It is regarded as the storehouse of knowledge of things simply existing. When it is strong, without being accompanied by reflecting power, the mind is full of facts, but unable to reason from them. After puberty, the size of the organ of Individuality, as well as of the neighbouring organs of Size, Weight, Colouring, and Locality—all situated behind the superciliary ridge of the skull—is often rendered doubtful by the existence of a hollow space, of uncertain width and extent, between the two plates of the skull. This hollow is called the *frontal sinus*; and when it is large, there may be a great projection of the bone over the eyes, without a corresponding projection of brain within. When this part of the skull is flat, however, the organs must be at least as defective as the flatness indicates. Owing to the source of uncertainty here pointed out, and the smallness of the organs behind the eyebrows, the functions of those parts of the brain are not regarded as being so well ascertained as those of the larger organs, nor will a cautious phrenologist be too ready to pronounce them large.

23. *Form*.—When the organ of Form is large, the eyes are wide asunder. Dr Gall discovered it in persons remarkable for recognising faces after long intervals, and although perhaps only once and briefly seen. The celebrated Cuvier owed much of his success in comparative anatomy to his large organ of Form. Decandolle mentions that 'his [Cuvier's] memory was particularly remarkable in what related to forms, considered in the widest sense of that word; the figure of an animal seen in reality or in drawing never left his mind, and served him as a point of comparison for all similar objects.'

24. *Size*.—Every object has size or dimension; hence a faculty seems necessary to cognize this quality. The supposed organ is situated at the inner extremities of the eyebrows, where they turn upon the nose. A perception of size (including distance) is important to our movements and actions, and essential to our safety.

25. *Weight*.—A power to perceive the different degrees of weight and force is likewise essential to man's movements, safety, and even existence. Phrenologists have generally localised the organ of that power in the part of the brain marked 25 on the bust.

26. *Colouring*.—The organ of this faculty is large in great painters, especially great colourists, and gives an arched appearance to the eyebrow; for example, in Rubens, Titian, Rembrandt, Salvator

Rosa, and Claude Lorraine. In cases of colour-blindness, it is found small. Many persons, though able to distinguish colours, have no perception of their harmonies: for this perception, a higher endowment of the faculty seems to be required.

27. *Locality*.—Dr Gall was led to the discovery of this faculty by comparing his own difficulties with a companion's facilities, in finding their way through the woods, where they had placed snares for birds, and marked nests, when studying natural history. Every material object must exist in some part of space, and that part of space becomes place in virtue of being so occupied. Objects themselves are cognized by Individuality; but their place, the direction where they lie, the way to them, fall within the sphere of Locality. Its organ is large in those who find their way easily, and vividly remember places in which they have been. It materially aids the traveller, and is supposed to give a love for travelling. The organ was large in Columbus, Cook, Park, Clarke, and other travellers.

28. *Number*.—The organ of this faculty is placed at the outer extremity of the eyebrows and angle of the eye. It occasions, when large, a fullness or breadth of that part of the head, and often pushes downwards the external corner of the eye. When it is small, the part is flat and narrow between the eye and the temple. Dr Gall called the faculty *le sens des rapports des nombres* (the Sense of the Relations of Numbers), and assigned to it not only arithmetic, but mathematics in general. Dr Spurzheim more correctly limits its functions to arithmetic, algebra, and logarithms; geometry being the products of other faculties, particularly Size and Locality. Dr Gall first observed the organ in a boy who could multiply and divide, mentally, ten or twelve by three figures, in less time than expert arithmeticians could with their pencils. Many such examples are on record.

29. *Order*.—The organ of this faculty is said to be large in those who are remarkable for love of method, neatness, arrangement, and symmetry, and are annoyed by confusion and irregularity. In savages, whose habits are slovenly, filthy, and disgusting, the organ is comparatively small.

30. *Eventuality*.—The organ is situated in the very centre of the forehead, and when large, gives to this part of the head a rounded prominence. Individuality has been called the faculty of *nouns*; Eventuality is the faculty of *verbs*. The first perceives merely things that exist; the other, motion, change, event, history. The most powerful knowing minds have a large endowment of both Individuality and Eventuality; and such persons, even with a moderate reflecting capability, are the clever men in society—the acute men of business—the ready practical lawyers. The organ of Eventuality is generally well developed in children, and their appetite for stories corresponds.

31. *Time*.—Some persons are called walking time-pieces; they can tell the hour without looking at a watch; and some even can do so, nearly, when waking in the night. The impulse to mark time is too common, too natural, and too strong, not to be the result of a faculty; it is an element in the love of dancing, almost universal in both savage and civilised man.

32. *Tune*.—The organ of Tune is large in great musicians; and when it is small, there is an utter incapacity to distinguish either melody or harmony. The great bulk of mankind possess it in a moderate endowment, so as to be capable of enjoying music in some degree. Those in whom it is large and active, become, in all stages of society, distinguished artists, exercising a peculiar power over their

excessive.—CONSCIOUSNESS is the knowledge which the mind has of its own existence and operations.—ATTENTION is not a faculty, but the application, or tension, of any or all of the intellectual faculties.—ASSOCIATION is the succession of ideas in the mind, each seeming to call up that which succeeds; so that in our waking-hours the mind is never without an idea passing through it. This is a state or condition of the faculties, not a faculty.—PASSION is any faculty in excess: Love is the passion of Amativeness in union with Adhesiveness and Veneration; Avarice, of Acquisitiveness; Rage, of Destructiveness.—PLEASURE and PAIN, JOY and GRIEF, also belong to each faculty, according as it is agreeably or disagreeably affected.—HABIT is the power of doing anything well, acquired by frequently doing it. But before it can be done at all, there must be the faculty to do it, however awkwardly.—TASTE was held by Mr Stewart to be a faculty, and to be acquired by habit. It seems to be the result of a harmonious action of all the faculties.

Such is an outline of the system propounded by the phrenologists. So far as it shall be confirmed by the mature experience and observation of competent inquirers, the facts and principles which it unfolds must be of great practical value to mankind. The study of the mutual influence of the mind and body has ever been recognised by wise and observant men as one of high importance, though of great difficulty; and certainly, Gall and his followers have not only given a strong impulse to that study, but have thrown much light on the diversities of human character, and accumulated a large body of facts of a kind which had previously been too much overlooked. Much, it is admitted, still remains to be discovered. 'No phrenologist,' says Mr Combe, 'pretends that Gall's discoveries are perfect; they are far from it, even as augmented and elucidated by his followers; but I am humbly of opinion that, in their great outlines, his doctrines are correct representations of natural facts. . . . The future of phrenology will probably exhibit a slow and gradual progress of the opinion that it is true and important; and only after this stage shall have been passed, will it be seriously studied as science. Hitherto this has not been done: the number of those who have bestowed on it such an extent of accurate and varied observation and earnest reflection as is indispensable to acquiring a scientific knowledge of chemistry, anatomy, natural philosophy, or any other science, is extremely small; and the real knowledge of it, on the part of such as continue, through the press and in public lectures, to oppose it, appears to me scarcely greater than it was in 1815 and 1826,' when it was ridiculed in the *Edinburgh Review*.

In considering the claims of phrenology, two questions should not be confounded. One is—How far the functions of the different parts of the brain have been established by observation of extreme instances of their large and small development?—the other, To what extent the facts so ascertained can be applied physiognomically in practice? Gall disclaimed the ability to distinguish either ill-defined modifications of forms of the skull, or the slighter shades of human character (*Sur les Fonctions du Cerveau*, iii. 41); nor, we believe, did he or Spurzheim ever pretend to estimate the size of every organ in a single brain. By attempting too much in these directions some of their disciples may have helped to prolong the incredulity with which phrenology is still widely regarded.

For the titles of numerous books on phrenology, see GALL (F. J.), SPURZHEIM (J. G.), and COMBE (G.); also an article in *The British and Foreign*

Medical Review, vol. ix. p. 190. Among the more recent works bearing on, or criticising phrenology, we may mention Dr Laycock's *Mind and Brain, or the Correlation of Consciousness and Organisation* (2 vols. Edin. 1860); his article on Phrenology in the 8th ed. of the *Encyc. Brit.*; an article on Phrenological Ethics in the *Edinburgh Review* for January 1842, vol. lxxiv. p. 376; Aug. Comte's *Philosophie Positive*, tom. iii. (or Miss Martineau's transl. i. 466); Sir Benj. C. Brodie's *Psychological Inquiry*, Dialogue vi. (Lond. 1854); G. H. Lewes's *Bio. Hist. of Philos.*, p. 629 (Lond. 1857); Samuel Bayley's *Letters on the Philosophy of the Human Mind*, 2d Series, Letters xvi.—xxi. (Lond. 1858); and Professor Bain *On the Study of Character, including an Estimate of Phrenology* (Lond. 1861). Sir William Hamilton's objections, mostly published many years since, and which are now appended to his *Lectures on Metaphysics*, i. 404 (Edin. 1859), were discussed in the *Phren. Jour.*, vols. iv. and v., and are remarked on by Mr Combe in his work *On the Relation between Science and Religion*, pref., p. xvii. (Edin. 1857).

PHRYGANEA. See CADDICE.

PHRYGIA, a country in Asia Minor, the extent and boundaries of which varied very much at different periods of ancient history. In pre-historic ages it is believed to have comprised the greater part of the peninsula, but at the time of the Persian invasion it was limited to the districts known as Lesser Phrygia and Greater Phrygia—the former stretching from the Hellespont to Trœas (inclusive), the latter occupying a central portion of Asia Minor. The inland boundaries of Lesser Phrygia are not well ascertained; but Greater Phrygia was bounded on the N. by Bithynia and Paphlagonia, on the E. by Cappadocia and Lycaonia, on the S. by the Taurus range, and on the W. by the maritime countries of Mysia, Lydia, and Caria. At a later period it was considerably reduced by the formation of Galatia (q. v.) and the extension of Lycaonia. P. was in general a high and somewhat barren plateau, though its pastures supported immense flocks of sheep, noted for the fineness of their wool, as indeed they still are. The most fertile part was the valley of the Sangarius, but the most beautiful and populous district was the southwest, at the base of the Taurus, where the Meander and other streams had their rise. The mountains and streams yielded gold; Phrygian marble was anciently celebrated, and the cultivation of the vine appears to have been extensively carried on.

The origin of the Phrygians is one of the mysteries of ancient ethnology. Some think that they were settled at a very remote period in Europe, and that they emigrated from Thrace into Asia Minor; and Xanthus, Herodotus, and Strabo certainly speak of such a migration. Xanthus places it after the Trojan war; but if there be any truth in the tradition at all, it can only refer to a return of some tribes to the cradle of the race in the valley of the Sangarius, for the Phrygians were regarded as one of the oldest races (if not the very oldest) in Asia Minor. Instead of seeking for their origin in Thrace, the best classical ethnologists seek for it in the neighbouring highlands of Armenia, whence the Phrygians are believed to have spread at a period far before the dawn of authentic history over the greater part of the Peninsula, and thence to have crossed into Europe, and occupied the greater part of Thrace, Macedonia, and Illyria; while the mythic Pelægs, who colonised the Peloponnesus, and gave it his name, was said by tradition to be a Phrygian. In both Greek and Latin poetry the Trojans are also called Phrygians, and the same name is applied to other nations of Asia Minor, such as the Mydians and

Britain, but is pretty frequent in flower-gardens. It has ovate triangular downy leaves, dirty-white flowers; and the fruit when ripe is a shining red berry, enclosed in a very large vermilion-coloured bladder. The berries have a sweetish subacid taste; they are seldom eaten in Britain, but very generally

varnish, in order to which it is boiled with oxide of iron.—The FRENCH P. N., or SPANISH P. N. (*C. multifidus*), a shrub, native of the tropical parts of America, with many-lobed leaves, yields a purgative acrid oil, called *Oil of Pinhoe*. It is very similar in its qualities to the oil obtained from the former species, perhaps stronger. To this genus belongs the PINONCILLO (*C. lobatus*) of Peru, the seed of which is eaten when roasted, and has an agreeable flavour, although when raw it is a violent purgative. When an incision is made in the stem of this tree, a clear bright liquid flows out, which after some time becomes black and horny. It is a very powerful caustic, and retains this property for years.

PHYSICAL GEOGRAPHY. See GEOGRAPHY.

PHYSICIANS, THE ROYAL COLLEGE OF (of London), was founded in 1518 by the munificence of Thomas Linacre, a priest and distinguished physician, who was born in 1460, and died in 1524. In 1519, through the influence of Cardinal Wolsey, he obtained from Henry VIII. letters-patent granting to John Chambre, himself, and Ferdinandus de Victoria, the acknowledged physicians to the king, together with Nicholas Halswell, John Francis, Robert Yaxley, and all other men of the same faculty in London, to be incorporated as one body and perpetual community or college. They were permitted to hold assemblies, and to make statutes and ordinances for the government and correction of the College, and of all who exercised the same faculty in London and within seven miles thereof, with an interdiction from practice to any individual unless previously licensed by the President and College. Linacre was the first president, and held the office till his death in 1524. The meetings of the College were held at his house in Knight-rider Street, which he bequeathed to the College, and which, until the year 1860, continued in the possession of that body. About the time of the accession of Charles I., the College, requiring more accommodation, took a house at the bottom of Amen Corner, which was subsequently purchased by Dr Harvey, and in 1649 was given by him to his colleagues. This was the seat of the College till 1666, when it was destroyed by the great fire of London. A new College was then built in Warwick Lane, and opened in 1674 under the presidency of Harvey's friend, Sir George Ent; and here the meetings were held till 1825, when the present edifice in Pall-Mall East was opened under the presidency of Sir Henry Hallford.

The reason for forming the incorporation, as set forth in the original charter, is 'to check men who profess physic rather from avarice than in good faith, to the damage of credulous people;' and the king (following the example of other nations) founds 'a college of the learned men who practise physic in London and within seven miles, in the hope that the ignorant and rash practisers be restrained or punished.' The charter further declares, that 'no one shall exercise the faculty of physic in the said city, or within seven miles, without the College licence, under a penalty of £5;' that, in addition to the president, 'four censors be elected annually to have correction of physicians in London and seven miles' circuit, and of their medicines, and to punish by fine and imprisonment;' and that 'the President and College be exempt from serving on juries.' Four years later, in 1522—1523, an act was passed confirming the charter, and enacting that 'the six persons before said named as principals and first-named of the said commonalty and fellowship, shall choose to them two men of the said commonalty from henceforward to be called and cleaped Elects, and that the same elects yearly choose one of them to be president of the said commonalty;' and

Love Apple (*Physalis edulis*).

in many parts of the continent of Europe. They are refrigerant and diuretic, and were formerly employed in medicine on account of these properties.—The DOWNY WINTER CHERRY, or PERUVIAN GOOSEBERRY (*P. pubescens* or *P. Peruviana*), is an annual American species, densely clothed with down; with heart-shaped leaves, yellow flowers, and yellowish berries which are eatable, and when preserved with sugar, make an excellent sweetmeat. It is cultivated and naturalised in many of the warmer parts of the world, and sometimes ripens its fruit in England, and even in Scotland.—Some of the other species of *P.* are among the most common weeds of the West Indies and tropical America; and the fruits of some of them are occasionally eaten, although not esteemed.

PHYSETER. See CACHOLOT.

PHYSIC NUT (*Curcas*), a genus of plants of the natural order *Euphorbiaceae*, having a 5-partite calyx, 5 petals, and 8–10 unequal-unioned stamens. The species are not numerous. They are tropical shrubs or trees, having alternate, stalked, angled or lobed leaves, and corymbs of flowers on long stalks; and notable for the acrid oil of their seeds. The COMMON P. N. of the East Indies (*C. purgans*), now also common in the West Indies and other warm parts of the world, is a small tree or bush, with a milky juice. It is used for fences in many tropical countries, and serves the purpose well, being much branched and of rapid growth. The seeds are not unpleasant to the taste, but abound in a very acrid fixed oil, which makes them powerfully emetic and purgative, or in large doses poisonous. Instances have recently occurred of very alarming, although not fatal, results from the eating of the seeds, imported into Britain under the name of *Physic Nuts*, *Jatropha Nuts* or *Jatropha Seeds* (the Linnæan name of the plant being *Jatropha purgans*), and *Barbadoes Nuts* or *Barbadoes Seeds*. The expressed oil, commonly called *Jatropha Oil*, is used in medicine like croton oil, although less powerful; it is also used in lamps. The milky juice of the shrub is used by the Chinese for making a black

again strongly attracted to it, although only for a short time, by the writings of Lavater (q. v.).

PHYSIOLOGY (Gr. *physis*, nature; *logos*, a discourse) is the science which treats of the phenomena which normally present themselves in living beings, of the laws or principles to which they are subject, and of the causes to which they are attributable. It is, in short, the science of life, and hence the term *Biology* (Gr. *bios*, life) has been adopted by some writers in place of physiology. Biology is, however, regarded by some authors (and, we think, correctly) as including in its scope more than physiology, as will be seen from the following extract from Professor Greene's remarks 'On the Principles of Zoology': 'Biology,' he observes, 'is that branch of scientific inquiry which undertakes to investigate the nature and relations of living bodies. Every living being may be regarded from two points of view, which it is necessary to distinguish clearly from one another. The first of these exhibits to us living beings as possessing definite forms, which, in most instances, are found to be made up of a number of dissimilar parts or organs; while the second takes cognizance of the vital actions or functions which these organs perform. That department of biology which determines the former is termed *Morphology*; that which investigates the latter, *Physiology*. Hence the nature of living beings is twofold—*morphological* and *physiological*.'—*A Manual of the Protozoa*, 1859, pp. ix—x.

PHYTOLACCA, a genus of exogenous plants, of the natural order *Phytolacaceae*. This order contains about 70 known species, half-shrubby and herbaceous plants, natives of warm parts of Asia, Africa, and America, and is nearly allied to the order *Chenopodiaceae*, from which it is distinguished by the frequently numerous carpels, the corolla-like perianth when the carpel is single, and the stamens either exceeding the number of the segments of the perianth, or alternate with them. It is also nearly allied to *Polygonaceae*. The genus *Phytolacca* has for its fruit a berry with 8–10 cells, each cell one-seeded. *P. decandra*, the Poke or Pocom, a native of North America, now naturalised in some parts of the south of Europe, is sometimes cultivated for its young shoots, which, when blanched, are eaten like asparagus. Yet the leaves are acrid, and the root is an emetic almost or altogether equal to ipecacuanha. The root is also externally applied to cure itch and ringworm. A tincture of the ripe berries, which are fully larger than Black Currants, and grow in racemes, is efficacious in chronic rheumatism and syphilitic pains. By some it is held to be more valuable than guaiacum. The pulp of the berries is employed in the adulteration of wine.—The young shoots of *P. acinosa* are boiled and eaten in the Himalayas, those of *P. octandra* in Cayenne, and a Chinese species has recently been introduced into British gardens for the same use under the name of *P. esculenta*.

PHYTOLOGY, another name for Botany, not much in use.

PHYTOZOA (Gr. *phyton*, a plant; *zōon*, an animal), also called *Antherozoids*, are minute bodies produced amidst a mucilaginous fluid in the antheridia of many cryptogamous plants (Algae, Hepaticae, Mosses, Ferns), which are either aquatic or delight in moist situations. In some many-celled antheridia of the higher cryptogamous plants, each cell is devoted to the production of a single phytozoon. When the antheridium is mature, and bursts, the phytozoa move for a short time by means of cilia—a provision, apparently, for their reaching the pistillidia, the spores contained in which—according

to an opinion rapidly gaining ground among naturalists—they are destined to fertilise. Great diversities exist in the phytozoa of different cryptogamous plants. The annexed figure will convey a better notion of them than any mere description.



Phytozoa:

(From Carpenter on the Microscope.)

- A. Antherozoids of *Fucus platycarpus* (a sea-weed), some of them free, others still included in their antheridial cells.
- B. Cellular contents of an antheridium of *Polytrochum commune* (a moss), mature and discharging the antherozoids.
- C. Antherozoid of *Pteris serrulata* (a fern) showing a, its large extremity; b, its small extremity; d, e, its cilia.

Cryptogamous plants, which, as lichens, live in dry situations, have no phytozoa, although it is supposed that they have organs destined to the same purpose, but destitute of the power of motion by cilia.

PIACENZA, a city of Northern Italy, in the province of the same name, on the right bank of the Po 2 miles below the confluence of the Trebbia with that river, and 36 miles west-north-west of the city of Parma. Beautifully situated on a fine plain, confined on the south by well-cultivated hills, the city itself is gloomy and desolate in appearance. Its streets are broad and regular—that called the *Stradone* is one of the most beautiful in Italy—but many of them are unfrequented and grass-grown. It contains numerous palaces, and about 50 churches. The cathedral, an edifice in the ancient Lombard style, founded in the 11th c., is famous for the richly-curious and grotesque character of its internal decorations, for its numerous sculptures, its paintings, and for a number of frescoes of great grandeur, by Caraccio, Guercino, and others. The Church of Sant'Antonio, the original cathedral of P., was founded in 324 A.D., but has been several times rebuilt. Among the other principal buildings, are the Palazzo Farnese, founded in 1558, and once a sumptuous edifice, but which has been long in use as a barracks; the Palazzo del Comune, and the Colonna dei Mercanti are fine monuments of art. The principal square is the Piazza Cavalli, so called from the colossal bronze equestrian statues of the dukes Alessandro and Rannuccio Farnese. The town occupies by far the most important position in a military point of view, in Italy—a fact which was fully appreciated by those who fortified it with solid walls and a strong castle, which, till 1858, were guarded by the Austrians. On being forced from the city by the war of 1859, the Austrians did not destroy the works, and the Italian government has strengthened and extended them by the formation of externally defended works, and of a formidable intrenched camp, which unites and protects the other works on the right bank of the Po.

thick, and coated with a fine coil of copper-wire; and the thickness, strength, and tension of the strings all diminish from the lower to the upper notes. A grand pianoforte has three strings to each of the upper and middle notes, and now, generally, only two to the lower notes, and one to the lowest octave. When the soft pedal is pressed down, the hammers are shifted sideways, so as to strike only two strings instead of three, or one string instead of two.

Besides the grand, the kinds of pianoforte in use are the square, in which the strings are placed still in a horizontal position, but obliquely to the keys; and the upright, in which the strings run vertically from top to bottom of the instrument. The difference in form necessitates alterations in the details of the action, but the general principle is the same.

The pianoforte has in modern times attained a widespread popularity beyond that of any other musical instrument. It possesses nearly all the powers of expression of any other instrument; on no other except the organ can we execute such complete successions of harmonies; no other represents the orchestra so well, with the advantage that the various parts adapted to it are brought out by the same performer. In all cities of the civilized world, there are numerous manufacturers of the pianoforte, employing multitudes of workmen; and even in the secondary towns of Europe, the number of makers is daily increasing. In England, the manufacturers who have for some time past enjoyed the highest repute are Messrs Broadwood, Collard & Co., and Erard; but other makers are rapidly approaching them in excellence. Till lately, the German makers adopted a much less perfect action than the English, producing a very different touch and tone; but they are now largely using the English action, which is spreading over the continent. Music for the pianoforte is written in two staves, and on the treble and bass-clefs. Many of the most eminent musicians have devoted themselves to composing for the pianoforte, and some composers of note, as Hummel, Czerny, Kalkbrenner, Chopin, Thalberg, Liszt, and Heller, have almost entirely confined themselves to that instrument. See Rimbault, *The Pianoforte, its Origin, Progress, and Construction* (Lond. 1860).

PIARISTS, called also familiarly *Scolopini*, or 'Brethren of the Pious Schools,' a religious congregation for the education of the poor, founded at Rome in the last year of the 16th century. The originator of this institute was a Spanish priest, named Joseph of Calasanza, who, while in Rome, was struck with the imperfect and insufficient character of the education which then prevailed, even for the children of the higher classes, and conceived the idea of organising a body for the purpose of meeting this want, which the Jesuit Society had already partially supplied. The school which he himself, in conjunction with a few friends, opened, rapidly increased in number to 100, and ultimately to 700 pupils; and in 1617, the brethren who, under the direction of Joseph, had associated themselves for the work, were approved as a religious congregation by Paul V. (q. v.), who entered warmly into this and all other projects of reformation. In 1621, Gregory XV. approved the congregation as a religious order. The constitution of the order was several times modified by successive popes, down to the time of Innocent XI. Its field of operations has, of course, been confined to European countries; and at present it can reckon communities in Italy, Austria, Spain, Hungary, and Poland. In Italy, during the revolutionary wars, the P. received into their ranks many members of the suppressed Society of the Jesuits. In Spain, their establishments were spared,

on the general suppression of religious orders in 1836. In Poland, eleven houses still were in existence in 1832. The number of members in Hungary is said to be about 400, and the order is also found in the other dependencies of Austria. See Wetzer's *Kirchen-Lexicon*.

PIA'SSABA, or PIACABA, a remarkable vegetable fibre which, during the last twenty years, has become an article of much importance in this country. It is procured from Brazil, chiefly from the ports of Para and Maranhão, and is produced by one or more species of palm. That which furnishes the greater part is the Coquilla-nut Palm (*Attalea funifera*); but Mr Wallace states that much of it is procured from a species of *Leopoldinia*, which he has named *L. piassaba*. The fibre is produced by the stalks of the large fan-like leaves. When the leaves decay, the petioles or stalks split up into bundles of cylindrical fibres of a dark-brown colour, and of a hard texture, varying in thickness from that of a horse-hair up to that of a small crow-quill. This material has been found of great utility in making brushes of a coarse kind, particularly those required to sweep the street; and for this purpose they have almost superseded birch-brooms, split whale-bone brushes, and other similar means for scavengers' work. The coarsest fibres are best for such purposes, and the finer ones are found very valuable for finer kinds of brushes.

PIA'STRE (Gr. and Lat. *emplastron*, a plaster; transferred in the Romanic languages to anything spread out or flattened, a plate, a coin), a Spanish silver coin which has been extensively adopted by other nations. It was formerly divided into 8 silver reals, and hence was termed a *piece of eight*, which name was invariably applied to it by the Buccaneers of the Spanish Main. The present Spanish piastre, commonly known as the *peso duro*, *peso fuerte*, or, briefly, *duro*, is the standard of the money system, and is equivalent to about 4s. 3d. of our money. It is divided into 20 copper reals (*reales de vellón*). In the Levant, the piastre is called a *colonnato*, on account of the original coins, which were struck for use in Spanish America, bearing two columns on the reverse side.—The Italian piastre, or *scudo*, is an evident imitation of the Spanish coin, and is exactly equal to it in value.—The same is true of the piastres in use in Chili, Mexico, and South America, with the sole exception of New Granada, where it is about 2½d. sterling less. The Dollar (q. v.) of the United States of North America was adopted from the Spanish piastre, but is a fraction less in value, owing, it is said, to an error in the original estimate. The original Spanish 'pillar' piastres or dollars are current nearly all over the world.—The coin known as the Turkish piastre is not an imitation, but is an independent national silver coin, which, in 1753, was worth about 3s. 6d. sterling, but has since gradually and rapidly deteriorated, till at the present day it is equal to not more than 2½d. of our money.—The Egyptian piastre is worth about 2½d. sterling. Pieces of 2, 5, 10, and 20 piastres are struck in silver, and of 50 and 100 in gold; the piece of 100 piastres being in Egypt the exchange at par for £1 sterling.

PIA'ZZA, an open place or square. The name is also applied to a portico or arcade, such as often surrounds a piazza in warm countries.

PIAZZI, GIUSEPPE, a celebrated astronomer, was born at Ponte in the Valteline, July 16, 1746. He was received into the order of the Theatins at Milan in 1764; and studied in that city, and subsequently in the houses of the same order at Rome and Turin. Summoned to the professorial chair of Philosophy at Genoa, he so alarmed the Dominicans by the

high dignity of a prince of the empire. The king of Spain conferred upon him the order of the Golden Fleece, and bestowed upon him in fief the duchy of Amalfi, which had previously belonged to his family. P. died at Vienna, 11th August 1656, leaving no children; his son Max, who figures in Schiller's *Wallenstein*, is only a poetical fiction. His fame as a warrior and general is somewhat tarnished by his cruel treatment of a number of Hessian and Luneburger prisoners in 1640.

PICHEGRU, CHARLES, a French general, was born 16th February 1761, at Arbois, in the department of Jura, France. Though of humble parentage he succeeded in gaining admission to the college of his native town, where, and subsequently at Brienne, he received a thorough education. He was specially distinguished in mathematics, and had some thoughts of devoting himself to teaching as a profession; but the advice of Father Perault induced him to enter an artillery regiment in 1783, and he had risen to the rank of a lieutenant when the Revolution broke out. P. became an ardent democrat; joined the army of the Rhine, and by his brilliant soldierly qualities soon attracted general attention. In 1793, he became commander-in-chief of the army, and in conjunction with the army of the Moselle under Hoche, repeatedly defeated the Austrians, took from them many important towns, as Gemersheim, Spire, Worms, &c., and established himself in the Palatinate; while, after the arrest of his coadjutor Hoche, his success at the head of the combined Rhine and Moselle armies was not less decided. The rapidity and boldness of his manœuvres, when he took the command of the army of the north, in 1794, disconcerted the allies; and before long they were compelled to retreat beyond the Meuse. After a brief respite, P. crossed this river, driving the British before him; and by February 1795, had completed the conquest of the Dutch towns and provinces, ending the campaign by capturing the enemy's fleet (which had been frozen in). He next visited Paris, and while there, suppressed an insurrection of the faubourgs (1st April 1795); but soon afterwards returned to the army, which was now opposed to the Austrians on the western frontier, and for some time displayed his usual skill and energy, crossing the Rhine in the face of the enemy, and capturing Mannheim, the chief fortress, on its banks. But the anarchy which he had found at Paris, combined with the flattering promises and bribes held out to him by the Prince of Condé, converted P. into a secret partisan of the Bourbons. His remissness, the unwonted folly and awkwardness of his military manœuvres, though prearranged with the Austrian generals, was not suspected till he suffered himself to be shamefully defeated at Heidelberg, and then retreated, leaving Jourdan (q. v.) without support, thus compelling the latter also to retire. The suspicions of the Directory were now aroused, and being confirmed by the seizure of P.'s correspondence, he was immediately superseded by Moreau (q. v.), and retired to his native town, where he lived till 1797, when he was elected one of the council of Five Hundred. He soon became president; but continuing his intrigues with the Bourbons, he was arrested, and subsequently transported to Cayenne. Escaping in June 1798, he made his way to Surinam, whence he sailed for England. He now entered heart and soul into the Bourbon conspiracy along with George Cadoudal (q. v.), the two Polignacs, De Rivière, and others, the primary object being the assassination of the First Consul. The conspirators secretly reached Paris, and there P. attempted to persuade Moreau, who was also a royalist, to join with them, but

without success. But the plans of the conspirators were soon known to the police; and an intimate friend of P., with whom he resided, sold the secret of his retreat to the police for 100,000 crowns. P. was surprised in his sleep, and carried off naked to the Temple, where he was found dead in his bed on the morning of 6th April 1804. The Royalists have endeavoured to fasten a charge of private assassination on Napoleon, but it is more generally believed that P. strangled himself.

PICHINCHA, an extinct volcano in the west cordillera of the Andes, in Ecuador, about ten miles north-west of Quito. It is of irregular form, and is 14,984 feet in height. Around the crater are two other peaks of nearly equal elevation.

PICHLER, KAROLINE, one of the most eminent novelists of Germany, was born in 1769 at Vienna, where her father, Franz von Greiner, held several legal offices and court dignities. In 1796, she married Councillor Andrew Pichler, and published her first work under the title of *Gleichnisse* (Wien, 1800). This was quickly followed by other writings, as the novels *Olivier* (Wien, 1802); *Leonora* (Wien, 1804); *Ruth* (Wien, 1805), &c.; and the success which attended the appearance of these productions, encouraged her to try a more ambitious line of composition. In 1808 appeared *Agathokles*, which, according to some critics, is the best of her novels. In this work, she endeavoured, in opposition to the views expressed by Gibbon, in his *History of the Decline of the Roman Empire*, to depict the ennobling effect of Christianity on the human mind. At the suggestion of Hormayr and other literary friends, who had been struck by the success with which she threw herself into the spirit of the times of which she wrote, she turned her attention to the task of popularising German history, with the view of fostering a more general feeling of patriotism. Among her best works of this kind, which appeared between 1811 and 1832, and the earlier of which preceded Scott's greatest historical novels, we may instance *Grafen von Hohenberg* (Leip. 1811); *Die Belagerung Wien's von 1683* (Wien, 1824); *Die Schweden in Prag* (Wien, 1827); and *Henriette von England* (Wien, 1832); while of her social novels, the following are among the most popular: *Fräulein von W.* (Wien, 1808); *Die Nebenbuhler* (Wien, 1821); and *Zeitbilder* (Wien, 1840). She died at Vienna in 1843. Her dramas were failures, and in her novels there is not a little tedious diffuseness, a remark which applies with equal truth to her autobiography, which appeared at Vienna in 1844 under the title of *Denkwürdigkeiten a. m. Leben*, and formed part of the edition of her collected works, published at Vienna in 1845 in sixty volumes.

PICKET, in Military Language, has several significations. It applies to a stake shod and sometimes ringed with iron, driven into the ground, and used to sustain ropes, which mark off sections in a camping-ground, or for tying horses to. These pickets are four or five feet long. Short pickets about eight inches long are employed as anchors for the ropes extending tents.—In Fortification, pickets are pointed stakes for pinning gabions together and to the ground; also, when pointed at both ends, and laid close together, of different lengths, and in a position inclined towards the front, they form a powerful obstruction to the advance of a storming-party, having a great effect in breaking a line of soldiers.—*Picket* was formerly a military punishment, where the culprit was held by the raised arm in such a position that his whole weight fell on one foot, which was supported on a picket with a blunt point. The time the man thus stood was proportioned to the offence. The punishment became,

against all the scholars of Europe, and undertaking to pay the expenses of those who came from a distance. P. presumptuously entitled his theses *De Omni Re Scibili* (On Everything that can be Known), and Voltaire sarcastically added, *et de quibusdam aliis*, which addition is as true as it is witty. P. had several encounters with notable scholars, and is reported to have come off victorious on every occasion. But his very success was the cause of misfortune. The church appointed a committee to report on the propositions of the young prince, and the result was that several of them were condemned as 'heretical,' although the author was acquitted of any heretical intentions. P. now withdrew from Rome, and after a short time settled in Florence, where he austere devoted his whole time to the composition of polemical treatises against Jews and Mohammedans, and to the refutation of judicial astrology. Among his closest friends were Politian and Ficino. He died 17th November 1494, at the early age of 31. A complete edition of his works was published at Bologna in 1496; it has since been frequently reprinted. The principal are *Heptaplus, id est de Dei Creatoris Opere sex Dierum Libri Septem*, an allegorical explanation of Creation as recorded in the Book of Genesis; *Conclusiones Philosophicæ, Cabalisticæ et Theologicæ*—these are the famous propositions which excited so much ferment at Rome; *Apologia Concordiæ Comitibus*; *Disputationes adversus Astrologiam Divinatricem Libri xii.*; *Aureæ ad Familiæres Epistolæ*; *De Hominis Dignitate*. P. is a happy illustration of the immediate effects produced in literature by the 'revival of letters'; he is full of a specious kind of universal learning, zealous and enthusiastic, but destitute of originality, depth, or creative power. 'He was,' says M. Matter, 'a prodigy of memory, elocution, and dialectics, but neither a writer nor a thinker.'

PICOTEE. See CARNATION.

PICROTOXINE ($C_{10}H_5O_4$) is the active principle of *Cocculus indicus*, from which it may be extracted by boiling alcohol, or by water containing a little hydrochloric acid. It crystallises in colourless prisms. This substance is extremely poisonous, one-third of a grain being sufficient, when introduced into the stomach of a cat, to produce tetanic convulsions and death in ten minutes.

PICTOU', a thriving seaport on the north coast of Nova Scotia, on the north shore of an ample and perfectly protected harbour, 85 miles in direct line north-north-east of Halifax. Lat. of light-house, 45° 41' N.; long. 62° 40' W. It stands in a fertile and well-cultivated district, with extensive coal-mines and quarries of building-stone in the vicinity. In 1859, it exported 105,528 tons of coal. It also exports building-stone, dried fish, and potatoes. Its commerce is rapidly increasing. The mean summer temperature of P. is 63° 52', and the mean temperature for the year is 42° 09'. Pop. (1861) about 3000.

PICTS, the ancient inhabitants of the north-eastern provinces of Scotland. Everything connected with the history of the P. has been made matter of controversy, and it is not easy to ascertain the truth, where the information given by early writers is so scanty, and where most modern authors seem only to have looked for materials to support a favourite theory.

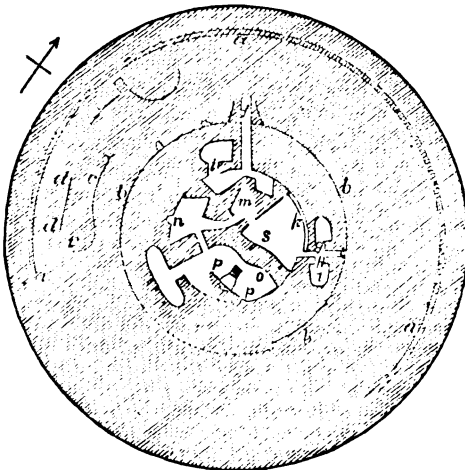
It will be unnecessary to enter on an examination of the name itself. The 'Picti' of the Romans probably represented a word by which the nation was known in its own language, as well as the barbaric custom to which the well-known expression of Claudian, '*neq. falso nomine Pictos*,' bears reference. Of much more importance is the inquiry regarding

the origin and language of the Picta. This is what, among Scottish antiquaries, has been emphatically called 'the Pictish question'; respecting which the best-known and most amusing, and certainly not the least useful discussion, is that between Jonathan Oldbuck and Sir Arthur Wardour, in the sixth chapter of *The Antiquary*. The disputants can hardly even now be said to be agreed; but the prevailing opinion is, what sound criticism always pointed to, that the P. were a Celtic race—perhaps the first known inhabitants of Northern Britain, and (as some hold) to be identified with the Caledonians of the Roman writers. At the time when they became generally spoken of under the name of P., they occupied the whole territory north of the Firth of Forth, except the western portion, which had been colonised or subdued by the Scots, another Celtic nation, whose chief seat was in Ireland—the proper and ancient Scotland. The southern boundary of the P. was the Roman province of Valentia, embracing the territory between the two Roman walls. At a later period, when Britain was abandoned by its imperial rulers, the boundaries of the various nations occupying the northern part of the island may be traced with considerable distinctness. Making allowance for partial changes at various times, these boundaries may be held to be the following: The Pictish territory extended along the whole sea-coast from the Firth of Forth to the Pentland Firth. It was bounded on the west by the country of the Scots, which extended along the western coast from the Firth of Clyde to the modern Ross-shire; but the precise line between the two nations cannot be ascertained. The country of the P. was bounded on the south by the Firth of Forth and the province of Lothian, then possessed by the English; while the country of the Scots had for its southern boundaries the Firth of Clyde and the kingdom of Cumbria, held by the independent Britons.

The Pictish nation consisted of two great divisions, called the Northern and the Southern P., the boundary between them being the mountain range known afterwards as the Grampians. These divisions seem at some times to have been ruled by different princes, at other times to have been under one sovereign. The P. were converted to Christianity at different periods. The Southern P. received the faith from St Ninian, Bishop of Candida Casa, early in the 5th century. This is mentioned by Bede, and the fact itself has never been doubted; but controversy, as usual, has been busy with the details. The point in dispute is the situation of the P. who owed their conversion to Ninian (q. v.). A careful examination of the statements of Venerable Bede, and the fuller but less trustworthy narrative of Ailred of Rievaulx, will shew that the Southern P., converted by Ninian, had their seat north of the Forth; that they were, in fact, the great division of the Pictish nation occupying the country between the Firth and the Grampians. The labours of Ninian were carried on and completed by teachers whose names are well known to the readers of ecclesiastical history—Palladius, Serf, Terman, and others. The Northern P. owed their conversion to a teacher of higher renown—St Columba (q. v.). The life of that abbot, from his leaving Ireland in 563, to his death in 597, was chiefly spent in converting the Northern Picts. Their ruler at this time was Brude, son of Malcon, whom Bede styles a very powerful king. His chief residence was on the banks of the Ness, and there Columba baffled and confuted the heathen Magi in the manner recorded by his biographer Adamnan. It is impossible to ascertain the precise character of the superstitions held by the P. before their conversion. Those whom Adamnan

the *Irish Annals*, edited by O'Connor. The best modern works on the subject are Innes's *Critical Essay*, and his *Civil and Ecclesiastical History of Scotland*; Pinkerton's *Inquiry*; Chalmers's *Caledonia*, vol. i.; Ritson's *Annals of the Caledonians, Picts, and Scots*; Mr Grub's *Ecclesiastical History of Scotland*, vol. i.; and a dissertation 'On the Probable Relations of the Picts and Gael with the other Tribes of Great Britain' in Garnett's *Philological Essays*, pp. 196—204.

PICTS' HOUSES, the name popularly given in many parts of Scotland to the rude underground buildings, more commonly and accurately called EARTH-HOUSES (q. v.). The name is often given also to a more advanced class of buildings of the same kind, found in the more northern counties of Scotland. The ground-plan of one of these at Kettleburn, in Caithness, explored and described by the late Mr A. H. Rhind, of Sibster, is figured in the accompanying woodcut. The outmost circle



Pict's House at Kettleburn, Ground-plan.

represents the extreme limits of the mound which covered the structure; *a*, a bounding wall, three feet thick, and three feet high, rudely built of large unshaped stones; *b*, an inner wall, four or five feet high; *c* and *d*, fragments of walls faced outwards; *e* and *f*, passages leading to the inner chambers; *g*, *h*, and *i*, passages leading to smaller side chambers; *k*, a wall within the wall of the chamber *s*; *m*, a chamber, so ruined that its walls could not be traced all round; *n*, a large boulder, which, being difficult to remove, had been built over; *o*, a chamber containing a regularly built well (between *p* and *p*), nine feet deep, and roofed over. The whole walls were built without mortar. The objects found within them were remains of animals and shell-fish, fragments of pottery, and implements of stone, bone, horn, bronze and iron. The name of Picts' Houses is also occasionally given in the north of Scotland to rude stone structures above ground.

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cause this to be done, or knowingly import into the United Kingdom, or sell, &c. such copies, he shall forfeit to the proprietor of the copyright a sum not exceeding £10, and the copies and materials shall belong to such proprietor. Moreover, if any person affix a mark, monogram, or initials of a person who did not execute or make such work, to paintings, drawings, or photographs, or fraudulently so exhibit, or offer such for sale, such person shall forfeit £10, or double the price of the thing sold, &c., and all spurious copies and imitations become forfeited to the real owner. This statutory protection to artists and owners of pictures, engravings, and photographs extends to the United Kingdom.

PI'OUS AND PI'CIDÆ. See WOODPECKER.

PIE, a well-known culinary preparation, consisting of a crust of dough or pastry, enclosing either meat or fruit, and baked in the oven. The origin of the word is very obscure. There are two kinds of pies, one in which a dish is used, as in cases where much juice or gravy has to be retained; the other, without the dish. The latter are called raised pies, and a particular kind of paste is required; which is made with hot lard and water, and must have sufficient consistency to stand up. When moulded into the form or case of the pie, it is filled with meat, usually game, and baked. This kind of crust is not usually eaten with its contents as it is considered unwholesome, it therefore merely serves as a case for the enclosed viands.

PIEDMONT, or PIEMONT (Fr. *pied*, foot, *mont*, mountain), an Italian principality, which now forms the north-west part of the kingdom of Italy, is enclosed mostly by natural boundaries, having on the N. the Pennine Alps, on the W. the Graian and Cottian Alps, on the S. the Maritime Alps and Genoa, and on the E. the Ticino and the duchy of Parma. It includes the former duchy of Montferrat (q. v.), which lies in its south-eastern corner, and the Sardinian portion of the old duchy of Milan, and contains 11,777 English square miles, with a population (1857) of 2,746,384. The mountain ranges which form its boundary on the north, west, and south, attain, in various places, a great elevation above the sea; the Col de Tende, Monte Viso, Mont Cenis, Mont Iseran, Mont Blanc, Mont St Bernard, Mont Cerna, Monte Rosa, and the Simplon, being all on the boundary-line. As to its general character, the country is partly mountainous, partly hilly, and much diversified with hill and dale; the ranges which traverse the country being spurs from the alpine boundary, and converging towards the central tract, through which flow the Po and its chief tributary the Tanaro. The valleys which separate these ranges are all watered by rivers which take their rise in the Alps, and pour their supplies into either the Po or the Tanaro, according as they come from the north and west, or from the south. The amount of the water-supply in the country may be imagined when it is considered that in P. the Po receives no fewer than 10 tributaries on the left, and 6 on the right, all of them of considerable size, and some of them, as the Tanaro and Dora Batea, worthy of being classed as rivers. The valleys of the Po and Tanaro are exceedingly rich and fertile, producing abundant crops of grain, pulse, hemp, chestnuts, olives, and many kinds of fruit. Maize and barley are the chief cereals, the former being the ordinary article of food to the inhabitants, while abundant herds of swine are fed upon the latter. The climate is mild in winter; but in summer, especially on the level country east of the Dora Baltea and the Tanaro, the heat is scorching, and this portion would be

embracing the dead body of her son. It is a counterpart to the *Madonna* with the infant Jesus in her arms. The one affords an opportunity for the representation of the purest joy and highest motherly love; the other, of the utmost pain and grief. The *pietà* has long been a favourite subject, not only with painters, but with sculptors. A famous one by Michael Angelo is in the Church of St Peter at Rome.

PIETISTS, a designation given since the end of the 17th c. to a religious party in Germany, which, without forming a separate sect, is distinguished not only by certain peculiarities of religious opinion, but also by the manner in which these are manifested. The peculiar character of their religion is very generally denoted by the term *pietism*, which is frequently employed with reference to the same tendencies of opinion, feeling and conduct, where-soever and whensoever exhibited. Pietism may be regarded as consisting in an exaltation of the importance of religious feeling, and of the practical part of religion, with a corresponding depreciation of doctrinal differences, and a contempt for outward ecclesiastical arrangements; and has been more or less strongly developed from time to time in all sections of the church, a tendency towards it always existing in a large class of earnestly religious minds. In the church of the middle ages, this tendency was displayed in an endeavour to attain to a superior spirituality and purity by means of religious contemplation and asceticism, and many, consequently, embraced a monastic life. The Reformers, adopting the Augustinian doctrines, rejected this mode of seeking deliverance from indwelling sin, and proclaimed the efficacy of faith in the sacrifice of Christ. But the controversies which arose among them, and increased among their successors, gradually gave a too exclusively doctrinal and polemical character to the sermons and writings both of the Lutheran and Calvinistic divines, particularly in Germany, and a reaction ensued, not in favour of the Church of Rome, but in favour of a religion of feeling and good works, or of the heart and life. Disgust at the sectarian bitterness and exclusiveness which prevailed, led even to an undervaluing of disputed points; and thus the *Pietism* of Germany was generated and developed. The origin of it is referred to a work entitled *Vom wahren Christenthume*, by John Arndt, published in 1605; to the *Invitatio Fraternitatis Christi* of John Val. Andrea, published in 1617, both of them Lutherans; and to the writings of Cocceius, a Calvinist. But its fuller development is unquestionably to be ascribed to Spener (q. v.), in the latter part of the 17th c., and to his friends and disciples. The name *Pietists* was first given in contempt to certain young *doctors* in Leipzig, who began in 1689 to give prelections on the New Testament both to students and citizens, and to addict themselves much to a meditative mode of life. Spener had held meetings of a somewhat similar kind in his own house when preacher at Frankfurt-on-the-Maine, and in his writings had urged the necessity of a reform in the Protestant church and theology. He and his followers dwelt much upon the importance of studying the Scriptures rather than the symbolical books, upon the unfitness of any unconverted or unregenerate person for the office of the ministry, upon the right and duty of the laity to take part in the exercises of Christian assemblies, and upon the necessity of a practical rather than a systematic religion. But many of the more extreme Pietists carried their antipathy to the doctrinalism and the established services of the church to a degree that alarmed the theologians of the old school, the high and dry Lutherans, or German 'moderates,' who accused

Spener and his disciples, not without reason, of a tendency to make all goodness and virtue consist in mere religious feeling, or pious sentimentalism; to represent the divine grace as operating in too subtle and abrupt a manner; to exaggerate the value of good works; to depreciate the value of learning; of clear intellectual perception in the study of Scripture, and to indulge in a strictness of judgment upon the religious character of the ordained clergy, tending to sectarianism, and indeed incompatible with ecclesiastical unity. The weapons of argument, however, were not the only weapons employed against them. The doctors were compelled to give up their prelections, and finally to leave Leipzig; the meetings for mutual edification were suppressed by the government as disorderly conventicles; and Francke, q. v., the most distinguished of the Leipzig doctors, having gone to Erfurt, was prevented from lecturing, and quickly compelled to retire. Spener's influence, however, procured a refuge for his friends in the newly founded university of Halle, and Francke obtained a professorship there. Halle became thenceforth the source of new religious influences, and, indeed, of a new religious life to Germany. The Pietists, although spiritually exclusive—disposed to regard themselves as the 'chosen of God' and to look down on all others as 'children of the world,' or even of the devil—did not attempt to form a separate sect. To do them justice, they were as far as possible from being ecclesiastically ambitious; all their desire was to extend a 'labours of love,' and to cultivate feelings of intensest piety. The rise of the Wolfian or Rationalistic theology, the spread of that sceptical anti-clerical philosophy which flourished for a while under the name of *Aufklärung* (Enlightenment), exercised an injurious and depressing influence on Pietism; yet through all the obstinate warfare maintained against the doctrine of the church by the Rationalists during the last half of the 18th, and the most part of the 19th c., Pietism continued to number some adherents; and it can hardly be doubted that it is to the Pietists, and not to the Lutheran dogmatists, that Germany is in a great measure indebted for that revival of religious faith and feeling which, begun with the great Schleiermacher—himself trained up under pietistic influences—has since widely diffused itself through her biblical scholars and theologians. The patriotic enthusiasm called forth by the insolent conquests of the French, naturally allied itself to pietistic tendencies, for in Germany, the triumphs of Napoleon and as emperor were looked upon as the triumphs of revolutionary, republican, and infidel principles, and after the general restoration of peace, to statesmen and upper classes, especially in Prussia, believing that political security could only be obtained by a return of the populace to the simple, obedient, and unquestioning piety of earlier times, countenanced this party in the church, and amiable tea-drinking societies of devout men and women were formed to distribute tracts, and to inculcate the radical and heathen masses with pietistic sentiments. But this attempt to use 'piety' for reactionary political purposes sullied its purity, and alienated from it the very parties whom it wished to influence. Still, however, Pietism exists as a distinct element in the religious life of Germany, and now, as ever, its strongholds are Prussia (Berlin, Silesia, Wupperthal), Hesse, and Würtemberg.

PIETRA-DURA, a name given to the finest kinds of Florentine mosaic-work, in which the inlaid materials are hard stones, such as jasper, carnelian, amethyst, agate, &c. The real *pietra dura* work dates as far back as the 16th c.

Its flesh is of very fine flavour.—The RING DOVE, WOOD P, or CUSHAT (*C. palumbus*), is the most common British species, and is diffused over great part of Europe, either as a permanent resident or a summer bird of passage, although it is not found at all in some of the most northern regions; and occurs also in the temperate parts of Asia, and the north of Africa. Its soft loud *coo* is one of the pleasant intimations of approaching spring. It inhabits woods, and builds its nest among the branches of trees. It is the largest of the British species, being about seventeen inches in entire length. It feeds on green corn, young clover, turnip-tops, grain, pulse, acorns, &c. Where it abounds, its voracity is often very injurious to the farmer. It is gregarious in winter. It is in considerable estimation as an article of food; but it is very shy and wary, not easily approached by an inexperienced sportsman.—These are all the British species of pigeon. Our limits quite preclude us from noticing almost any other. The RING-TAIL P. (*C. Caribbea*) may be mentioned as a West Indian species, much valued for the richness and delicacy of its flesh, which is reckoned one of the greatest luxuries of that part of the world. The BALD-PALE or WHITE-HEADED P. (*C. leucocephala*) is another large and fine species, plentiful in the West Indies. It migrates to the *Keys* of Florida in summer.—The DOUBLE-CRESTED P. (*C. dilopha*) is a large species, inhabiting the north of Australia and warmer regions to the northward, remarkable for its crest, which consists of two parts, one on the back of the head, and another of lax recurved feathers springing from the forehead, and even from the base of the bill.

Only one species of P. has been truly domesticated, and having long been so, it has undergone many remarkable changes, and there are numerous varieties or breeds; some of them, exhibiting very strange peculiarities, and known as *fancy pigeons*, being carefully preserved and tended by pigeon-fanciers. Pigeon-fancying is nowhere carried further than in London, where there are many persons who give great part of their time to it, and whose pigeons are their chief delight. The prices of such fancy pigeons as are deemed most perfect of their kind, are very high. The ordinary domestic pigeons, kept for profit as a kind of poultry, differ from the wild rock dove chiefly in colour, in which they are often very unlike it, although a tendency always manifests itself to return to the original colours, and the bars on the wings are apt to reappear in the progeny even of what may be called the most artificial varieties. Of these may be mentioned, as among the most interesting, the Rough-footed P., having the feet feathered; the Jacobin, which has a range of feathers inverted over the head, and extending down each side of the neck, as a hood; the Fan-tail, or Fan-tailed Shaker, in which the number of the tail-feathers is greatly increased, and the bird has the power of erecting its tail like that of a turkey-cock, whilst it has also a peculiar vibratory motion; the Tumbler, so called from tumbling in the air in its flight, and further characterised by a very short bill; and the Pouter or Cropper, which has the power of blowing up its crop to an extraordinary degree, so that the head seems fastened on the top of an inflated bladder. The Carrier P. (q. v.) is regarded as a variety of the Common Pigeon.

The law regarding pigeons is stated in the article DOVECOT. For the profitable keeping of pigeons, it is necessary to have a properly-constructed dovecot, divided into cells, a cell for each pair, each cell sixteen inches broad, by twelve from front to back, and the door towards one side, so that the nest may not be seen from without; a slip of wood in front

of each cell for the birds to sit and coo on. The dovecot must be placed at such a height as to be out of the way of rats and other depredators; and must be frequently cleaned, otherwise it may probably be deserted by its occupants. It ought to be painted white, that colour being very attractive to pigeons, and contributing to retain them when a new dovecot is established, in which there is often found to be not a little difficulty. Pigeons begin to breed at the age of nine months, and breed every month except in very cold weather. The male and female continue faithful to each other from year to year, a circumstance noted by Pliny and others of the ancients, and evidently, as well as their somewhat demonstratively manifested affection, a reason of the poetic references often made to the dove.

PIGEON PEA (*Cajanus*), a genus of plants of the natural order Leguminosæ, suborder Papilionaceæ, of which, according to some botanists, there is only one species (*C. flavus*), a native of the East Indies, but much cultivated also in the West Indies and in Africa; according to others, there are two species, *C. flavus*, with flowers entirely yellow, the pod marbled with dark streaks, and two or three seeds in each pod; and *C. bicolor*, called Congo Pea in the West Indies, the pulse of which is much coarser, and is used chiefly by negroes. The first kind is nearly equal to the Common Pea. This kind of pulse is very much used in tropical countries. The plant is a shrub (*Cytisus cajan* of Linnæus) about eighteen inches high. It is half hardy in the south of England. In tropical countries, the plants stand and are productive for several years. They throw off their leaves annually, and reproduce them along with their flowers. The P. P. is one of the most valuable of the tropical kinds of pulse. It grows either on rich or poor soils. It is called *Doll* and *Urhur* in the East Indies. The name P. P. is West Indian.

PIGMENTS. See PAINTS.

PIKE, PIKEMAN. Previously to the use of the bayonet, infantry of the line of battle—that is, the heavy-armed troops—were from the earliest times armed with pikes or spears. The Macedonians carried pikes 24 feet long; those of modern warfare averaged 12 or 14 feet. They were of stout wood, and tipped with a flat iron spearhead, which sometimes had cutting edges. As a defence against cavalry, the pike, from its length and rigidity, was of great value; but though it long survived the introduction of gunpowder, that event was nearly fatal to it. For success with the pike, especially in offensive war, a depth of several men was essential, and this depth rendered the fire of artillery peculiarly fatal. The pike is now superseded by the bayonet on the end of the musket.

PIKE (*Esox*), a genus of malacopterous fishes, including all the species of the family *Esoxidae*, as restricted by Müller, and characterised by an elongated body, covered with scales, a depressed head, and broad blunt muzzle, with very large mouth, abundantly furnished with teeth of various sizes on the jaws, palatine bones, and vomer; no adipose fin; and the dorsal fin placed very far back over the anal fin. The species are not numerous; they are all inhabitants of fresh water in the northern hemisphere. Only one is found in Europe, the COMMON P. (*E. lucius*), a native also of Asia and North America. It is very generally diffused over Europe, and is abundant even in its most northern regions; and is now abundant in lakes, ponds, and slow rivers in all parts of the British Islands, although it is supposed not to be truly indigenous to them, but introduced. The statement, which has been often made, however,

PIKE—PIKE-PERCH.

that it was introduced in the reign of Henry VIII., is certainly erroneous, as there is evidence of its existence in England at a much earlier date. Edward I., graciously regulating the price of commodities for his subjects, fixed the price of the pike higher than that of the salmon, and ten times higher than that of the turbot and the cod, from which we may perhaps infer its comparative rarity at that period. Some of the waters in the fenny districts of England are peculiarly adapted to pike, which are there found in very great quantity, and of superior quality.

The P. is of a dusky olive-brown colour on the upper parts, becoming lighter and mottled with green and yellow on the sides, and passing into silvery white on the belly; the fins brown; the larger fins mottled with white, yellow, and dark green. The tail-fin is forked. The P. grows to a large size, occasionally attaining a weight of sixty or seventy pounds, although the stories of pikes much larger than this are liable to suspicion. The excessive voracity of the P. has long been proverbial. No animal substance which it can swallow, and which is capable of being digested, seems to be unpalatable to it; and no animal large enough to attract its attention, and which it can master, escapes being devoured. Mr Jesse mentions an instance of eight pike, of about five pounds' weight each, consuming nearly 600 gudgeons in three weeks; and one of them devoured four roach, each about four inches in length, in rapid succession, and seized the fifth, but kept it in his mouth for about a quarter of an hour before

attached to them, the line being so fastened that the bait swims at a proper depth, and that some yards of line run out when the bait is taken. The floats are sometimes made of wood or cork, sometimes of bundles of rushes, sometimes of bottles. In angling for P., various baits are used, such as a minnow, par, or other small fish, a portion of a fish, &c., and sometimes an artificial fly is employed with great success, made of two large hooks tied together, and adorned with two moons from a peacock's tail. The angler unaccustomed to the P. must be cautioned as to the manner of the taking the hook from its mouth, as any rashness may lead to severe laceration of his hand by its teeth. P. may be fished any time from May to February inclusive, except when it is actually freezing. The best month is considered to be



Pike Spinner.

November; the P. are then in the best condition. One of the most approved tackles for angling for the P. is the *Spinner*, baited with a small dace, bleak, gudgeon, or par of about two ounces, as represented in the fig. The mode of using it is thus described in Bailey's *Angler's Instructor* (Longman & Co. 1857): 'Having cast your bait as far as possible, allow it, if you are fishing in a pond, or lake, or deep water, to sink a little, say two feet, then wind away at a brisk rate, holding your rod on one side rather low; if no run, wind out and throw again, but this time wind brisk four or five yards, then all of a sudden stop a moment, then off again, doing so three or four times in one cast. I have often found this a good plan. If you still have no run try another throw and wind brisk as before, but occasionally giving your rod a sharp but short twitch.' See also Otter's *Modern Angler* (Alfred and Son, London).

Other species of P. are found in the lakes and rivers of North America, as *Esox estor*, which is sprinkled with round blackish spots, and *E. reticularis*, which is marked with a network of brownish lines.

The Gar-fish (q. v.) is sometimes called the Sea Pike. The same name is also given to certain large voracious fishes of warm seas, belonging to the perch family.

—The Saury P. is noticed in a separate article.

PIKE-PERCH (*Lucioperca*), a genus of fishes of the perch family, having two dorsal fins, of which the first has strong spiny rays, but resembling the pike in its elongated form, large mouth, and formidable teeth. The muzzle is not, however, broad and depressed, as in the pike. Several species are known, of which one (*L. sandra*) is common in the Danube, and in most of the rivers and lakes of the north-east of Europe, extending westward to the Oder and the Elbe, although not found in Italy, France, or Britain. It is highly esteemed for the table, and its introduction into British rivers seems particularly desirable. Salted and smoked, it is a considerable article of trade in some parts of Europe. It is a fish of rapid growth, and attains a weight of 25 or 30 pounds. This fish readily takes the minnow and the artificial fly. It is called *Sander*, *Sandel*, or *Sandat*, in some parts of Germany; *Nagmail* in Bavaria; and *Schill* at Vienna.—Another species (*L. americana*), much resembling it, of a greenish-yellow colour, is found in the lakes and rivers of North America.

Pike, or Jack (*Esox lucius*).

swallowing it. The P. readily attacks a fish of its own size, and preys freely on the smaller of its own species. Frogs are frequent prey; water-rats and ducklings are sometimes devoured. A large P. often takes possession of a particular hole in the bank of a river, from which it issues to seize any creature that may pass.—The P. spawns in the beginning of spring, for that purpose ascending narrow creeks and ditches, in which it is very easily caught by nets. Large quantities are caught at the spawning season in Lapland, and dried for future use. The P. grows very rapidly when the supply of food is abundant, reaching a length of 8 to 10 inches in its first year, 12 to 14 in the second, 18 to 20 in the third, and afterwards increasing for a number of years at the rate of about four pounds every year. A young P. is sometimes called a *Jack* or *Pickrel*. The name *Luce* (Lat. *lucius*) is still known as an English name of the pike. The Scotch name is *Geld*, a name similar to those in the Scandinavian languages.

The flesh of the P. is much esteemed, but that of pikes of moderate size is reckoned superior to that of small, or of very large ones.

The P. is not only caught by means of nets, but by the rod, by set lines, and by trimmers or *liggers*, which may be briefly described as floats with lines

PIKE'S PEAK, a peak of the Rocky Mountains, in the U.S. territory of Colorado, lat. 39° N., long. 105° W., discovered by General Pike, U.S.A., in 1806. It is made by different measurements 12,000 and 14,500 feet high, and commands a view, of 100 miles' radius, of a rugged, mountainous country, containing many lakes, and the sources of four great rivers—the Platte, Arkansas, Rio Grande, and Colorado of California. In 1859, large deposits of gold were discovered in this region; and in 1860 it had a population of 60,000, and produced 4,000,000 dollars in gold. It abounds in rich gold-bearing quartz. The mining country is 5000 feet above the sea, with a dry climate, having a rainy season of only seven weeks. Denver City, the capital of the territory, has a population of 6000.

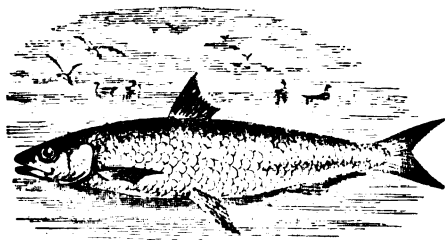
PILASTER, in Classical Architecture, a square pillar, sometimes standing free, but usually attached to a wall, from which it projects $\frac{1}{4}$ th, $\frac{1}{2}$ th, or other definite proportion of its breadth. Greek pilasters, or antae, were of the same breadth from top to bottom, and had different capitals and bases from those of the orders with which they were associated. The Romans gave them a taper like the columns, and the same capitals and bases.



Pilaster.

PILAU, or **PILAW**, a dish common in India, Turkey, Egypt, and Syria, consists generally of rice, but occasionally some animal food is added. It is sometimes seen at tables in this country, prepared for those who have been accustomed to it abroad. The correct method of preparing it is to boil the rice for twenty minutes, with sufficient water to soak it thoroughly, and swell the grains to their utmost, taking care not to break them by making them too soft; it is then drained, and gently stirred with butter, pepper, and finely-chopped onions, and served up. This is the way in which the pilau of the poorer classes are prepared; but for the tables of the more wealthy, fowls, lamb, mutton, shreds of ham or bacon, variously cooked, but always much boiled or roasted, are placed on the top of the rice, and served up with it. In India, very numerous and elaborate receipts are in use.

PILCHARD (*Clupea pilchardus*, or *Alausa pilchardus*), an important fish of the family *Clupeidae* (q. v.), referred by some naturalists to the same genus with the Herring (*Clupea*), and by others to the same genus with the Shad (*Alausa*). The P. is



Pilchard (*Clupea pilchardus*).

nearly equal in size to the herring, but rather thicker, and the lines of the back and belly are straighter; the scales are also larger and fewer; and the dorsal fin is rather further forward. The mouth is small, and in the adult fish destitute of

teeth; the under jaw longer than the upper. The upper part of the body is bluish-green; the sides and belly silvery white; the cheeks and gill-covers tinged with golden yellow, and marked with radiating stræ; the dorsal fin and tail dusky. The P. is an inhabitant of more southern seas than the herring, being nowhere plentiful on the British coasts, except in the extreme south, and chiefly on the coasts of Devonshire and Cornwall; whilst it occurs on many parts of the Atlantic coasts of France and Spain, and on the coasts of Portugal, and is found in the Mediterranean Sea. Like the herring, it was formerly supposed to be a migratory fish, annually visiting the coasts of England and other countries; but, as in the case of the herring, this opinion has now been relinquished; and the shoals of pilchards which are seen on the coasts are believed merely to issue from deeper waters near at hand, for the purpose of spawning. The spawning season of the P. begins early in summer; but on the coasts of Devonshire and Cornwall, the principal fishery is in August and September. Pilchards are caught either with drift-nets or sean-nets, but principally with sean-nets. By means of one or more seans, each 360 feet long and 36 feet deep, a shoal is enclosed; the bottom of the net is then drawn together by a peculiar contrivance, and the pilchards are taken out at low water by small bag-nets. Prodigious numbers are sometimes enclosed in a single sean. Twenty-four millions and a half are said to have been taken at once from a single shoal, which, however, may have been spread over several square miles. The approach of a shoal of pilchards is known by the rippling of the water, and the sea-birds hovering above, and is often watched for and marked from the shore. The P. fishery on the English coast has of late been comparatively unsuccessful, probably undergoing one of those unaccountable mutations of which there are so many examples in the herring fishery in different places; but in some years the quantity taken has been very great, and the capital invested in the P. fishery in Devonshire and Cornwall is probably not much under one million sterling. The English P. fishery is regulated by several acts of parliament, the first of which are of the days of Elizabeth. Great quantities of pilchards are annually exported to the West Indies and elsewhere. Those intended for exportation are pickled, and packed in barrels by means of great pressure, by which the bulk is reduced, and oil is expressed to the amount of three or four gallons from a hogshead of fish. The oil, with the blood and pickle with which it is mingled, is generally used for manure. A favourite Devonshire dish is a pie made of pilchards, with their heads protruding from the crust.—A great number of boats are employed in the P. fishery in and near the estuary of the Tagus.—The P. is known on the coasts of Scotland as the *Gipsy Herring*.

PILCOMAYO, a river of South America, whose course has not as yet been thoroughly explored, draws its waters from the Bolivian Andes, and is formed by the confluence of two rivers, the Suipacha and the Pilaya. Of these head-waters, the south one, the Suipacha, rises in the mountains immediately south of Potosi; while the northern branch, the Pilaya, drains the valleys around Chuquisaca. These streams unite in lat. about 21° 35' S., to form the P., which flows in a general direction south-east, crosses the Bolivian frontier, waters the north-east region of the Argentine Confederation, and falls into the Paraguay a few miles below Asuncion. It is at least 1200 miles in length; but its waters are much spent in lagunes on its course, so that it adds no great volume to the waters of the Paraguay. It is navigable for about 500 miles; but numerous

the congested state of the lower bowel by one or two doses of sulphate of magnesia, and a cooling vegetable diet, after which the continued use of mild laxatives should be resorted to. A teaspoonful of an electuary, consisting of an ounce of confection of senna, half an ounce of cream of tartar, and half an ounce of sulphur, if taken in the middle of the day, usually acts gently about bedtime, which is far the best time for the bowels of patients of this kind to act, as the parts irritated by the passage of the evacuation become quieted during the night. In long-standing cases, in which there is general relaxation of the mucous membrane, the confection of pepper in doses of a drachm may be given thrice daily with advantage, or a scruple of common pitch may be taken at bedtime in the form of pills or in capsules. Amongst the milder forms of local treatment must be mentioned (1) the injection of the rectum with cold water both before and after the motion; (2) washing the anus with yellow soap and water after each evacuation; (3) the application of gall ointment or of other astringents; and (4) the injection of astringent lotions, as, for instance, of sulphate of iron, in the proportion of a grain to an ounce of water. If these fail, recourse may be had to pressure by means of instruments specially devised for the purpose; to the application of strong nitric acid, which, in the case of internal piles, affords the most speedy and effective means of relief (the operation must, of course, be performed by a surgeon, and if the parts cannot be protruded, the acid must be applied through the speculum); to ligature; or, in the case of external piles, to excision. When the piles are inflamed, leeches to the anus (but not applied directly to the tumours) are sometimes required; but the inflammation generally subsides under the influence of rest in the horizontal position, fomentations, poultices, and low diet.

The treatment of the hæmorrhage that frequently accompanies piles requires a few words. If the bleeding is moderate in quantity, and has continued for some time without inducing weakness or any other bad symptom, it is not expedient to interfere with it. When, however, it obviously requires checking, the effect of cold water injected into the rectum, as already recommended, should be tried, and, in case of its failing, astringent injections should be had recourse to. At the same time, the patient should remain in the horizontal position, and take the medicines usually prescribed for internal hæmorrhage, amongst which may be especially mentioned oil of turpentine, in doses of twenty drops three or four times a day, or ergot of rye in divided doses to the extent of a drachm daily. In rare cases, it is necessary to tie a vessel, or to touch it with a red-hot wire (through the speculum), or to plug the anus.

PILEUS. See **FUNGUS**.

PILEWORT. See **RANUNCULUS**.

PILGRIM (Ital. *pellegrino*, Lat. *peregrinus*, 'a foreigner,' 'a visitor of foreign lands'). A pilgrim is a person who has undertaken, especially under vow, to visit, for the purpose of prayer and religious worship, some shrine, sanctuary, or other place, reputed to possess some especial holiness or religious interest. That the early Christians—as had been the habit of the Jews, and indeed of the pagan Gentiles also—regarded certain places with some sort of religious interest, seems beyond all question; and among all the places thus reputed as sacred, or at least venerable, the first rank was given to the Holy Land, and particularly to the scenes of the Passion of our Lord at Jerusalem. St Jerome (Ep. xlv.) speaks of the practice of

visiting Jerusalem as established ever since the discovery of the Holy Cross by St Helena, the mother of Constantine. He himself was a zealous pilgrim, and was followed by many of his friends and disciples; and throughout the 4th, 5th, and 6th centuries, pilgrims habitually undertook the long and perilous journey to the Holy Land from almost every part of the West. Other sacred places, too, were held to be fit objects of the same visits of religious veneration. The tombs of the apostles Peter and Paul, and the many tombs of the martyrs in the catacombs at Rome, are so described by St Jerome (*Commentar. in Ezekiel*). St Basil speaks in the same terms of the tomb of the Forty Martyrs; and the historian Theodoret tells of a practice exactly similar to that still seen in Catholic countries, of not only visiting such sanctuaries, but of hanging up therein as offerings, gold and silver ornaments, and even models of hands, feet, eyes, &c., in commemoration of the cures of diseases of their several members, believed to have been supernaturally obtained as the fruit of these pious visits. The PILGRIMAGE, however, pre-eminently so called, was that of the Holy Land; and even after Jerusalem had been permanently occupied by the Saracens, the liberty of transit for pilgrimage, on payment of a stated tax, was formally secured by treaty; and it was from the frequent violation of this immunity, and the necessity of protecting pilgrims from outrage, that the well-known MILITARY ORDERS (q. v.) had their origin. The CRUSADES (q. v.) may in some sense be regarded as a pilgrimage on a great scale; and the direct object of all the expeditions was to secure for the Latin Christians the permanent immunity of pilgrimage. On the other hand, the closing of the Holy Land against western pilgrims, consequent on the final abandonment of the Crusades, led to a great extension of what may be called domestic pilgrimage, and drew into religious notice and veneration many shrines in Europe, which, after the lapse of time, became celebrated places of pious resort. The chief places of pilgrimage in the West were: in Italy—Rome, Loretto (q. v.), Genetsano, Assisi; in Spain—Compostella, Guadalupe, Montserrat; in France—Fourviers, Puy, St Denis; in Germany—Oetting, Zell, Cologne, Trier, Einsiedeln; in England—Walsingham, Canterbury, and many others of minor note. The pilgrim commonly bound himself only by a temporary vow (differing in this from the palmer), which terminated with the actual visit to the place of pilgrimage, or at least with the return home, and by which he was bound for the time to chastity and to certain other ascetic observances. The costume consisted of a black or gray gabardine, girt with a cincture, from which a shell and scrip were suspended, a broad hat, ornamented with scalloped shells, and a long staff. Many abuses arose out of these pilgrimages, the popular notions regarding which may be gathered, although, probably, with a dash of caricature, from Chaucer's *Canterbury Tales*.

PILLAR, a detached support like a column; but its section may be of any shape, whereas the column is always round. Pillars have been used in all styles of architecture, and their forms and ornaments are usually amongst the most characteristic features of the style. The Greek and Roman pillars (or columns) are the distinguishing elements in the various orders. In Gothic architecture, also, the pillars are of different forms at the various epochs of that style. First, in the Norman period, we have plain massive pillars, square, circular, and octagonal, frequently ornamented with zigzag ornaments, spiral bands, &c., on the surface (fig. 1). As vaulting progressed, the

parallel to this plank another of similar dimensions was placed in a similar position with respect to the pole, and fixed to the former by a hinge, being thus capable of being moved upwards from it, or closed upon it, when necessary. A large circular hole is cut, with its centre in the line of junction of the two planks, and two corresponding holes of smaller size are formed, one on each side of it; the large hole is for receiving the neck, and the two smaller the wrists. When a criminal is to be placed in the pillory, he is made to mount and stand upon the platform; the upper of the two hinged planks is raised to allow the culprit's neck and wrists to be inserted in their proper grooves, and then brought down into its place, and fastened by a padlock, or in some other way. See for illustration the wood-cut to the article *OATES, TITUS*. The pillory seems to have existed in England before the Conquest, in the form of the stretch-neck (an instrument by which the neck only was confined), and was originally intended, according to the 'Statute of the Pillory' (51 Hen. III. c. 6), for 'forestallers, users of deceitful weights, perjury, forgery, &c., and all such dishonourable offences. Its use was exclusively confined to this class of offenders till 1637, when restrictions were put upon the press, and all who printed books without a licence were put in the pillory. From this time it became the favourite mode of punishing libellers (or those who were considered to be such by the government), authors and publishers of seditious pamphlets, or of strictures on the government; and many eminent men were accordingly from this time put 'in and on the pillory,' among whom may be mentioned Leighton, Lilburn and Warton the printers, Prynne, Dr Bastwick, Daniel Defoe, &c. The insufficiency of the pillory as a means of inflicting a definite amount of punishment was now apparent, for to those who were popular favourites it was no punishment at all, while those who were objects of popular dislike were ill-used to such an extent as occasionally to cause death. The sufferers above mentioned being popular favourites, or having at least a numerous class of supporters, were shaded from the sun, fed, and otherwise carefully attended to; while the encouragement, applause, and sympathy of the crowd around converted the intended punishment into a triumph, but such men as Titus Oates, and the class of offenders including perjurers, swindlers, polygamists, &c., who were objects of popular hatred and disgust, were pelted with rotten eggs (the favourite missile), garbage, mud, sometimes even with more dangerous missiles. In 1814 the celebrated naval hero Lord Cochrane (see *DUNDONALD, EARL OF*) was sentenced to the pillory, but the government of the day was not prepared to brave the consequences of such an act, and the sentence was not carried into effect. In France the pillory was anciently called *pilori*, and in recent times *carcan*, from the iron collar by which the criminal's neck was attached to the post; but punishment by this mode was abolished in that country in 1832.

PILLS are the most generally convenient and popular of all forms of medicine. They are formed from masses of a consistence sufficient to preserve the globular shape, and yet not so hard as to be of too difficult solution in the stomach and intestines. This form is especially suitable for (1) all remedies which operate in small doses, as metallic salts; (2) those which are designed to act slowly and gradually, as certain alteratives; (3) those which are too readily soluble when exhibited in other forms; (4) substances whose operation it is desirable to retard until they have reached the lower intestines, as in certain pills for habitual costiveness; (5) bodies whose specific gravities are

too inconsiderable to allow their suspension in aqueous vehicles; and (6) fetid substances: while it is unsuitable for (1) medicines which require to be given in large doses; (2) deliquescent salts; (3) fluid or semi-fluid substances, such as oils, balsams, &c., which require a very large proportion of some dry powder to render them sufficiently tenacious to form into a mass; (4) substances so insoluble, that when exhibited in solid form they pass through the intestinal canal unaltered, as extract of logwood (*Paris's Pharmacologia*, 9th ed. p. 550). Many substances, such as vegetable extracts, may be at once formed into pills without any addition; but most substances require the addition of a material termed an excipient, for converting it into a pill-mass. The excipients in most common use are bread-crumbs, hard soap, extract of liquorice, mucilage, syrup, treacle, honey, castor oil, and conserve of roses. From the property of preserving pills for a long time in a properly soft state, the most valuable excipient is the conserve of red roses; and, perhaps, next to it treacle is the most valuable excipient, as it does not undergo any change by time, but maintains a proper consistence, and preserves the properties of vegetable powders unimpaired for years. It is common to place pills in some fine powder, to prevent them from adhering to each other, and to conceal their taste. For this purpose, liquorice powder, wheat flour, starch, and magnesia are generally used in this country, and lycopodium on the continent. Pills retain their moisture and activity far longer in small bottles than in the ordinary pasteboard boxes. The ordinary weight of a pill is five grains; if it much exceeds that weight, it is too bulky to swallow conveniently if it consist of vegetable matter. It is very common to meet with patients who express their inability to take this form of medicine. If, however, they practise with a small globular mass, towards which they feel no repugnance, as a pellet of bread or a currant, placing it on the back of the tongue, and gulping it down with water, they will soon get over the difficulty.

PILOT is a person specially deputed to take charge of a ship while passing through a particular sea, reach, or dangerous channel. The intricacy of almost all coast navigation renders it impossible that any navigator, however skilful, can be master of all the waters to which he may have to sail his ship; and the risk of failure, through ignorance of local dangers, is therefore avoided by transferring the direction of her course to some one perfectly acquainted with the spot. The man to whom so much is intrusted must be a responsible person, and therefore in all countries qualified sailors are officially licensed to act as pilots in their districts, and they are granted the monopoly. The origin of the word pilot is uncertain; but it is probably taken from or nearly identical with the Dutch *piloot*, which is compounded of *peilen*, to sound the depth, and the root which appears in *D. lootsman*, *O. E. lodesman*, and signifies to lead, direct. Pilot thus means one who conducts a vessel by sounding. The laws of Wisby, promulgated at least as early as the 14th c., and subsequently incorporated in nearly every maritime code, render it compulsory on the master of a ship to employ a pilot when sailing near a coast.

The British laws relating to pilots were revised and consolidated by the act 16 and 17 Vict. c. 129. Certain fees are established in proportion to the distance and responsibility; and the master of every vessel, above 50 tons, passing up the Channel or the Thames, or *vice versa*, is required to accept the services of the first pilot tendering, provided he

The leaves and bark partake of the aromatic property for which the fruit is valued. The fruit, when ripe, is filled with a sweet pulp, and the aromatic property, which so strongly characterises it in an unripe state, has in a great measure disappeared. The gathering of the berries, therefore, takes place as soon as they have reached their full



Pimento.

size, which is about that of pepper-corns. They are gathered by the hand, and dried in the sun on raised wooden floors, during which process great care is taken, by turning and winnowing, to prevent them from being injured by moisture. Their colour changes in drying, from green to reddish-brown. When dry they are packed in bags for the market. Some planters kiln-dry them.—The name *Allspice* was given to P. from a supposed resemblance in flavour to a mixture of cinnamon, nutmeg, and cloves. P. is much employed in cookery, and is also used in medicine as a carminative and stimulant, to prevent the griping of purgatives, and to disguise the taste of nauseous drugs. It depends for its properties chiefly on a volatile oil, *Oil of P.*, which is obtained from it by distillation with water, and is sometimes used to relieve toothache, and for making the *Spirit of P.* (or of *Allspice*) and *P.* (or *Allspice*) *Water* of the shops.

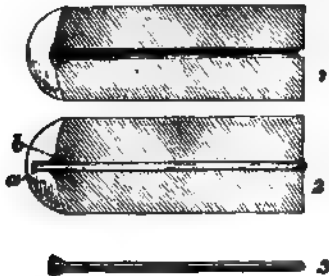
PIMPERNEL (*Anagallis*), a genus of plants of the natural order *Primulaceae*, having a wheel-shaped corolla, and the capsule opening by division round the middle. The species are elegant little annual and perennial plants, natives chiefly of temperate climates. The flowers are not large, but very beautiful.—The **SCARLET P.** (*A. arvensis*) is a common plant in Britain, occurring as a weed in fields and gardens; it is common also in most parts of Europe, and in many parts of Asia. The flowers are of a fine scarlet colour, with a purple circle at the eye. There is a common belief in England, mentioned by Lord Bacon, that when this plant opens its flowers in the morning a fine day may be expected; and they certainly close very readily on the approach of rain. They usually open about eight in the morning, and close about noon.—The **BLUE P.** (*A. cœrulea*) is far less common in Britain,

but very abundant in some parts of Europe.—The **BOG P.** (*A. tenella*), frequent in bogs in England, but rare in Scotland, is an exquisitely beautiful plant.—Several species are cultivated in our flower-gardens.—Acrid properties prevail in this genus, and *A. arvensis* has been used medicinally in epilepsy, dropsy, and mania.—The name **WATER P.** is given to *Samolus Valerandi*, also called *Brookweed*, another British plant of the same order, with racemes of small white flowers, growing in watery gravelly places. It is supposed to be the *Samolus* which Pliny says the Druids gathered fasting, with the left hand, and without looking at it, ascribing to it magical virtues in the cure and prevention of diseases in cattle. Its geographic distribution extends over almost all the world.

PIN. As a requisite of the toilet, &c., pins were first used in Britain in the latter part of the 15th c.; they were at first made of iron wire, but in 1549 brass ones were imported from France by Catharine Howard, queen of Henry VIII. Several inventions, however, were previously in use for holding together parts of the dress, such as buckles, brooches, laces, clasps, hooks, &c. At first pins were made by filing a point to a proper length of wire, and then twisting a piece of fine wire around the other extremity, or fixing it after twisting, in order to form a knob or head; and ultimately these operations were so skilfully conducted, that a completely round head was made of very small size, and scarcely shewing the nature of its construction. Some pins are still made in this way. It is surprising how many operations are needed to complete so small an article. They are as follows: 1. *Straightening and Cutting the Wire.*—The straightening is necessary, because the wire-drawers coil the wire as they make it upon a cylinder, and when it is unrolled, the coils remain. It is therefore drawn through an arrangement of upright iron rods which completely straighten it, after which it is cut into lengths of 30 feet, and these are again reduced to lengths of four pins. 2. *Pointing.*—This is done by two operations and different workmen, each standing at a separate grindstone; the first is the rough grinder, and the second the finisher. Each holds with the thumb on the palm of the hand a number of the wires amounting to 30 or 40, and by a movement of his thumb he manages to make the wires turn round so as to make a point to each as he holds them to the grindstones, the second of which, being of a fine material, gives them a smooth finish; they are then reversed, and the other end pointed. 3. *Cutting.*—The length of a single pin is cut off of each end of these pieces; the intermediate portions are then handed back to the pointers, and each end receives a point, after which they are divided into two, and thus the four pin piece is reduced into single pin lengths, each having a point. 4. *Twisting the Heads.*—These are made of very thin wire, which is coiled twice, by means of a lathe, around the end of another piece of wire the same thickness as the pins. 5. *Cutting the Heads.*—The head being formed on the thin wire, it is handed to another workman who cuts it off; these two operations are performed with great rapidity, so great, indeed, that as many as 12,000 have been made in an hour. 6. *Annealing the Heads.*—This is softening them by putting some thousands into an iron ladle, and after making them red hot, plunging them into cold water. 7. *Stamping or Shaping the Heads.*—This is pressing the heads into a better shape by means of a small lever press, and at the same time fixing them on the pins; a good worker will do as many as 12,000 to 15,000 per day. 8. *Yellowing or Cleaning the Pins.*—This is done by a process which is often called *enriving*; it consists in boiling them for about half an hour in

the dregs of sour beer, or a solution of argol or cream of tartar, and then washing them in clean water. 9. *Whitening or Tinning.*—In this process a large copper pan is used, and in it is first placed a layer of about six pounds of the cleaned or yellowed pins, and over these a layer of grain-tin to the amount of about eight pounds. Several alternate layers of pins and tin are put in one vessel, and then by a pipe arranged inside the copper pan water is gently poured in, and goes through the pipe to the bottom, first rising up through the different layers so gently as not to disturb them. Fire is now applied to the bottom of the pan, and when it is nearly boiling its surface is sprinkled with a quarter of a pound of cream of tartar, and the whole is slowly boiled for half an hour, then poured into a strainer and shaken, to separate the pins from the grain-tin and liquid; by this process a thin deposit of tin has been thrown on the pins, which now are white instead of yellow; without the souring this would not take place, it being essential that they should be quite free from any oxidation or soil. 10. *Washing.*—The pins are now thoroughly washed in pure water. 11. *Drying and Polishing.*—They are now put into a large leathern bag with a quantity of bran, and violently shaken backwards and forwards by two men. 12. *Winnowing.*—The bran is next separated by fanning. 13. *Pricking the Papers to receive the Pins.*—This is now done by an ingenious machine, through which the papers are passed, and which, at regular intervals, arranged according to the size of the pins, pinches up a fold of the paper, and at the same time pricks the holes to receive the pins, and then places the pins in their places. Formerly this required a separate operation. Thus fourteen persons were required to make and put up for sale a pin, and in some manufactories this is still the case; but in all the large establishments machines are now employed, and an immense reduction of hand labour is effected by them.

The first machine was invented by Lemuel Wellman Wright, of the United States, in 1824. This did very little more than make solid heads to the pins, by a process in principle like that used for nail-making—viz., by driving a portion of the pin itself into a counter-sunk hole. The action, however, was automatic, and consisted in an arrangement by which the wire was seized in two small grooved cheeks, as in figs. 1 and 2, which represent them separated. Fig. 1 has the groove empty, but in fig. 2 is seen the wire which projects at a. When both cheeks are



placed face to face, and the wire is held tightly in the groove with the small portion (a) projecting, a small ram or hammer connected with the machine strikes on a, and compresses it into the small cup-shaped depression b, and thus the head is formed, as in fig. 3. The pointing and dressing of the pins was afterwards carried on as described

in the processes for hand-made pins. Since Wright's invention many remarkable improvements have been effected in these machines, which have consequently become very complicated in their details, although the principles upon which they act are very simple. No description would convey a satisfactory idea of these wonderful pieces of mechanism, which now, without the aid of hands, complete the pin in all respects except the colouring and polishing; but a slight account of the leading features will enable the reader to understand their mode of working. First, then, a reel of wire as it comes from the wire-drawer is placed in the rear of the machine, and the end of the wire is taken hold of by a pair of nippers, which pull it over a fixed straightening board, and pass it on completely straightened, until it is seized by two cheeks similar to those in figs. 1 and 2, when a cutter descends and cuts it off, leaving the projecting part for the head; on the withdrawal of the cutter, the hammer flies forward, and makes the head as before described; the cheeks open, and the pins drop on to a sloping metal plate finely grooved, down which they slip with the heads upwards, until the end which is to be pointed comes in contact with a cylindrical roller with a grinding surface, which soon grinds points upon them, owing to two or three ingenious arrangements: the first is, that the grooved surface of the plate by which the pins descend terminates a little above the grinding roller, then a slight depression is given to the sloping plate and also to the roller, so that one end is an inch or two lower than the other; therefore, as the pin descends the groove (a, fig. 4), and is thus brought down the inclined plate until it lies on the smooth part (b, fig. 4), where it is highest, and with its end in contact with the grinding roller (c) which is revolving, the pin itself is compelled by the friction of the roller to turn round, and gradually descends from the upper to the lower part of the inclined plate (d), and then falls off into

Fig. 4.

a box placed to receive it. This is attempted to be shewn in fig. 4. These operations are performed so rapidly that they can scarcely be followed by the eye, and the pins fall into the box beautifully pointed in a complete stream. They are then yellowed, sized, and prepared for papering, which is a remarkable process. The machine by which it is done is worked by two children; one feeds the machine with pins, the other with papers. The first part of the machine is a box, about 12 inches

long by 6 inches broad and 4 inches deep; the bottom is made of small square steel bars, sufficiently wide apart to let the shank of the pin fall through but not the head, and they are just as thick as the space between papered pins; the bottom of the box, with the row of pins hanging through it, are seen in fig. 5. The lower part of the bottom of the

Fig. 5.

box at *a* is made to detach itself as soon as the row of pins is complete, and row after row at regular intervals is received and passed down a corresponding set of grooves, until they reach the paper which, as before described, is pinched into regular folds and pierced to receive the pins, which, by the nicest imaginable adjustments, come exactly to their places, and are pressed into them. In this way many thousands of these neat-looking paper packages of pins, with which all are familiar, are put up in one day by two little girls, aided by these wonderful machines.

PINA CLOTH, a very beautiful fabric made of the fibres of the leaves of the pine-apple plant (*Ananassa sativa*), and other allied species. This cloth is only made in Manila, and in its manufacture resembles horse-hair cloth, because the threads both of warp and weft are each single unspun fibres, consequently only small pieces can be made; the workers have, however, a plan of joining the fibres of the coarser kinds end to end, so as to make warp threads of considerable length. Pina cloth is very strong, and the better sorts far excel the finest lawns in texture. It is chiefly employed in the manufacture of ladies' pocket-handkerchiefs, which often have their costliness much increased by beautiful embroidery.

PINCHBECK is an alloy of zinc and copper, in which the proportions slightly differ from those which constitute brass; 3 parts zinc to 16 of copper constitute this material, instead of one part of the former to two of the latter as in common brass. Pinchbeck, when new, has a colour resembling red gold, and it was at the beginning of the present century much employed in making watch-cases and other small articles in imitation of gold.

PIND DADUN KHAN, a town in the Punjab, stands on a narrow verdant plain on the right bank of the Jhelum, and at the southern base of the Salt Range or Kalabagh Mountains, 110 miles north-west of Lahore. The town consists of three groups of houses, four miles from the Jhelum. The houses are built of mud, but the framework is of cedar-wood. In the vicinity, salt is extensively raised in the Salt Range. See **PUNJAB**. Entire population, 13,583.

PINDAR (Gr. *Pindaros*), the great lyric poet of Greece, was born, about 522 B.C., of a noble family of Thebes, at Cynoscephala, a village in that territory. His genius for music was hereditary, and at an early age he was sent by his father, himself a flute-player, to receive instruction in the same art from Scopelinius. At this time his genius for poetry too—foreshadowed, according to later writers, by a swarm of bees miraculously resting on his lips when asleep—began to develop itself, and so he went to Athens to be placed under the tuition of Lasus of Hermione, the founder of the Athenian school of dithyrambic poetry. Before completing his 20th year he returned to Thebes, where he continued to pursue his studies under Myrtis and Corinna, of Tanagra, two poetesses then famous in Boeotia. With both of his instructresses he contested the prize for music at Thebes, but was five times defeated by Corinna. He was still a young man when he entered on his professional career as a poet, and his services soon came to be in great request on festive occasions throughout all the Hellenic states. He composed choral songs for Hiero, tyrant of Syracuse; Alexander, son of Amyntas, king of Macedonia; Theron, tyrant of Agrigento; Arceasius, king of Cyrene; and also for many free states and private individuals. He won not only the admiration of his employers for his lyrical genius, but also their respect for his independent character, which, amid all the presents and rewards conferred upon him, never degenerated into that of the poet who merely performed for hire. He was especially the favourite of Alexander, king of Macedonia, and of Hiero, tyrant of Syracuse; and it is said that to the praises he lavished on the former of these monarchs his house owed its preservation at the hands of Alexander the Great, when he reduced the rest of Thebes to ruins. His life was for the most part spent abroad at the courts of kings, and at the scenes of the great public games; and at one period, 473 B.C., he resided at Syracuse at the court of Hiero for the space of four years. He died most probably in 442 B.C., in his 80th year. Of the immense number of his poems, consisting of hymns to the gods, paeans, dithyrambs, odes for processions (*prosoidia*), maidens' songs (*parthenia*), mimic dancing songs (*hyporchemata*), convivial songs (*scolia*), dirges (*threnoi*), and encomia on princes, we only possess fragments. His *Epynia*, or Triumphal Odes, however, have come down to us entire; and it is from these—divided into four books, and celebrating the victories won at the Olympian, Pythian, Nemean, and Isthmian games respectively—that we must form an opinion of P. as a poet. A victory at these games conferred honour not upon the winner and his family only, but also on the city to which he belonged; and for its celebration—which began with a procession to the temple, where sacrifices were offered, and ended with a convivial banquet—a poem was specially composed, and was sung by a chorus either during the procession, or, more frequently, at the banquet (*comus*). P.'s poetical style is peculiar. Full of bold conceptions and striking metaphors, his manner is so rapid and so subject to abrupt transitions, as to render him not only a difficult but an obscure composer. Typical examples of his strength, as well as of his weakness, will be found in the Second Olympian and First Pythian Odes, where the description of the Islands of the Blest in the former, and of an eruption of Mount Etna in the latter, are brilliant offsets to the shadowy mythological allusion and the undeveloped metaphor which also characterize them. His metres, in spite of the able efforts of Böckh, still remain to be satisfactorily elucidated; and all that we can

by distillation, which is a kind of universal medicine among the peasantry of Hungary, as is also the resin spontaneously exuding from the tree, which is known as *Hungarian Balsam*.—The **BLACK P.**, or **BLACK FIR** (*P. nigricans*, or *P. Austriaca*), is another species closely allied to the Scotch P., but remarkable for its very long leaves. It is a native of Austria. It abounds in resin more than any other European tree.—To the same group of pines belongs the **SEASIDE** or **TAURIAN P.** (*P. Pallasiana*, *maritima*, or *Taurica*), which also affords resin in great quantity, and of a very pleasant odour. It is found in many parts of the south of Europe. Its timber is of little value; but great part of the turpentine of the *Lawles* and other maritime districts of France is obtained from it. It yields also part of the *Burgundy Pitch* of the apothecaries' shops.—The **ALEPPO P.** (*P. Halepensis*), a native of the south of Europe, Syria, &c., is a very graceful tree of moderate size, with leaves in pairs and slender. It yields a liquid resin or turpentine, which is extracted from it in Provence and elsewhere, and sold as *Venice Turpentine*. The wood is extensively used in the Levant for shipbuilding.—The **LARICIO** (*P. Laricio*) has leaves in pairs, lax, and 4–8 inches long, cones 2–4 inches long, with the scales slightly pointed. It is often called the **CORSICAN PINE**. It grows on the shores of the Mediterranean Sea, and is valuable both for its timber and for its resinous products. In the island of Corsica, it frequently attains the height of 140 feet. It grows well in sandy soils, and has been made particularly useful for preventing the drifting of the sand, and turning to account the otherwise useless tracts between the mouths of the Garonne and the Adour in France, thus also preserving valuable lands which the sand threatened to overwhelm.—The **PINASTER** or **CLUSTER PINE** (*P. Pinaster*) is another of the most important European species. It has cones in whorls of 3, 4, or even 8 together, 4–6 inches long, leaves in pairs, and very long. It is found on the shores of the Mediterranean, and also in the Himalaya and in China. It has been used in France to a great extent, in the same way as the Laricio, for covering waste sandy tracts. The timber is of inferior quality, but great quantities of resin are procured from it. It yields *Bordeaux Turpentine*.—The **PYRENEAN P.** (*P. Pyrenaica*) is a majestic tree, a native of the Pyrenees, and producing very fine timber.—The **CALABRIAN P.** (*P. Bruttia*) somewhat resembles the Pinaster.—The **STONE P.** (*P. pinea*) a tree with a broad umbrella-shaped head, a form often seen also in the Scotch fir, forms a characteristic feature of the scenery of the Mediterranean, and is very often introduced in paintings. It is the *Pinie* of the Germans, the *Pignon* of the French. The leaves are in pairs, 4–5 inches long; the cones very large, ovate, and obtuse. The seeds, which do not ripen till the fourth year, are large, abundant in a fixed oil, and when fresh, have a sweet taste resembling that of almonds. They are used in Italy and other countries in the same way as almonds and pistachio nuts for the dessert, in various dishes, also in emulsions, &c., under the names of *pinies*, *pinioles*, and *pignons*. The use of them, however, is almost entirely confined to the countries in which they are produced, as they very soon become rancid. They are sometimes imported into London in the cone, in which way they can be kept longer, but the cost of importation is much increased. The wood of this tree is very useful and beautiful. It yields resinous products only in small quantity.—The **CEMBRA P.**, or **SWISS STONE P.**, which grows in the central parts of Europe and the south of Siberia—a stately tree, with the lower branches more persistent than they

are in most pines, and rigid leaves in groups of three to five—also produces eatable seeds (*Cembra Nuts*), which, although they are extracted with difficulty,



Stone Pine (*P. pinea*).

are much used. The cuticle contains a resinous juice; but in Siberia, this fruit is so much prized that noble trees are often cut down to obtain it. The Cembra P. yields a pellucid, whitish oil, resembling oil of turpentine, and known as *Carpenter's Balsam*.

North America produces many species of P., some of them very beautiful and very valuable. Besides those long known, and which are found in the states and colonies near the Atlantic, a number of the noblest species of this genus have, since the commencement of the present century, been discovered in California and the north-western parts of America.—The **RED CANADIAN P.** (*P. resinosa*) is found from Canada to the Pacific, but does not reach far south in the United States. It is the **YELLOW P.** of Canada and Nova Scotia. It delights in dry and sandy soils, and attains a height of 70–80 feet, with a diameter of two feet at the base, the trunk continuing of uniform diameter for two-thirds of its length. The leaves are in pairs, and are congregated towards the extremities of the branches. The timber is highly esteemed for strength and durability, and furnishes excellent plank for ship-building. It is also used for masts.—Some-what resembling this in botanical characters, is the **SCRUB P.**, or **GRAY P.** (*P. Banksiana*), generally only 3–10 feet high, which begins to appear in the northern parts of the United States upon high mountains, and is interesting as an arctic species extending further north than any other.—The **YELLOW P.** (*P. variabilis*, or *P. mitis*) abounds in the Atlantic States from New Jersey to Virginia. It is a tree of 50–60 feet high, 15–18 inches in diameter at the base, with leaves 4–5 inches long, usually in pairs, but sometimes in threes upon the younger shoots. The timber is very extensively used for ship-building, and is largely exported to Great Britain. At Liverpool, it is known as **NEW YORK PINE**.—The **JERSEY P.**, or **SCRUB P.** (*P. nirops*), abounds in the lower parts of New Jersey, and thence to the south-west. Its leaves are in pairs, 1–2 inches long, the cones armed with strong spines. The tree is rarely 30 or

cubic feet. Next in importance to these is the pine-timber of the British North American colonies, which is chiefly yielded by the Weymouth Pine (*Pinus Strobus*), although, doubtless, the wood of other coniferous trees is often substituted for it. The celebrated pitch-pine of Savannah, in the Southern States, is the produce of *Pinus rigida*. It is much used for ships' masts and yards, and for all purposes requiring great strength and durability, in both of which qualities it excels most others of its kind. The American war has, for the last three years, cut off the supply of this useful timber; but from her colonies in North America Great Britain imported, in 1862, upwards of 55,000,000 cubic feet of other kinds of pine timber. The kinds above mentioned are those which constitute the greater part of the pine-timber used in ship and house-building, carpentry, &c., in Great Britain. In France, the timber of the Corsican Pine (*Pinus Laricio*) and the Seaside Pine (*Pinus pinaster*) are greatly used. In Italy, the pine-timber is chiefly yielded by the Stone Pine (*P. pinea*) and the Calabrian Pine (*P. Bruttia*); that of Spain is from the Pyrenean Pine (*P. Pyrenaica*). In Germany, and especially in Austria, the Black Pine (*P. Austriaca*) furnishes the greater portion; but the fine-grained, soft white pine, or deal, so much used for sounding-boards of musical instruments, is the wood of the Silver Fir. See FIR. The trade in this timber is very great, for not only do the Germans use it almost exclusively in their vast toy-manufactories and for lucifer-matches, but considerable quantities are exported. The finest is cut in the forests of Bohemia, where large establishments are formed for dressing and preparing the wood for various purposes.

The timber of the Norfolk Island Pine (*Araucaria excelsa*) is sometimes imported for making ships' masts, as several other kinds of pine-timber are imported from time to time, but those mentioned form the great staples of the timber-trade. The chief value of this class of timber-woods is in the combination of lightness and strength with softness of texture and ease in working with ordinary tools; they constitute, in fact, the principal materials of our builders, and are more used than all other kinds of wood together. Much confusion prevails as to their common designations, for in this country alone, *fir*, *pine*, and *deal* are terms applied to all and each of them, according to the caprice of the individual. The two first names are used because the material is derived from one or other of those genera; but the last is a misnomer altogether, as the term deal belongs only to pieces of fir or pine timber cut to particular sizes: they are three inches in thickness, nine inches broad, and of variable length; if of less width, they are called *battens*.

PINEAL BODY, is a small reddish-gray body, of a conical form, and deriving its name from its resemblance to the fruit of the pine. It rests upon the corpora quadrigemina of the brain, in front of the cerebellum. It is about four lines in length, and from two to three in width at its base. It is larger in the child than in the adult, and in the female than in the male. It consists chiefly of gray matter, and in its base is a small cavity, which contains a transparent viscid fluid, in which are granules composed chiefly of phosphate and carbonate of lime, and termed *acervulus cerebri*. This organ was regarded by the ancients as the seat of the soul.

PINE-APPLE, or **ANANAS** (*Ananassa sativa*) a plant of the natural order *Bromeliaceae*, highly esteemed, and much cultivated for its fruit. The

fruit is a *sorosis*, formed by the calyces and bracts of a close spike of flowers, becoming succulent and combined. This is the distinctive character of the genus *Ananassa*. The P. has a number of long, serrated, sharp-pointed, rigid leaves, springing from the root, in the midst of which a short flower-stem is thrown up, bearing a single spike of flowers, and therefore a single fruit. From the summit of the fruit springs a crown or tuft of small leaves, capable of becoming a new plant, and very generally used by gardeners for planting; the P., in cultivation, being propagated entirely by crowns and suckers, as, in a state of high cultivation, perfect seed is almost never produced. The P. is a native of tropical America; it is found wild in sandy maritime districts in the north-east of South America, but it has been very much changed by cultivation. It has also been gradually diffused over tropical and subtropical countries, and not only as a cultivated plant, for it is fully naturalised in many parts both of Asia and Africa. It delights in a moist climate, and consequently does not succeed well in the dry climate of the south of Italy, although the warmth is sufficient. The first particular account of the P. was given by Oviedo in 1535. It was in Holland that it first began to be cultivated in hot-houses; but it was introduced into England in the end of the 17th c., and its cultivation rapidly became general in the gardens of the wealthy. It is only since the peace of 1815 that it has received similar attention in continental Europe. Great care is requisite in the cultivation of the P., which, without it, is generally fibrous and coarse, with little sweetness or flavour; and with it, one of the most delicate and richly flavoured of fruits. Its size also very much depends on cultivation. The size varies from 2½ lbs. to 12 lbs. in weight. The pine-apples grown in British hot-houses are generally much superior to those of the West Indies, because the latter grow almost or altogether without cultivation; but the importation of pine-apples from the West Indies having now been carried on to a considerable extent, and promising to add to the sources of wealth for these colonies, has led to greater care in cultivation there, and consequent improvement of quality.

In the cultivation of the P. in Britain, a tropical heat must always be maintained. It is generally cultivated in hot-houses specially appropriated to it, called *Pineries* or *Pine-stoves*; sometimes also in flued pits; and sometimes even without fire-heat, in frames continually supplied with fresh tanners' bark and dung. The universal practice, till of late, was to grow the plants in pots, plunged to the requisite depth in tanners' bark or other fermenting matter, and these were transferred from one house or one compartment to another, according to their stage of advancement; three years' culture being deemed requisite from the planting of a crown or sucker to the production of the ripe fruit; but the P. is now often planted in beds, and fruit of the best quality is sometimes obtained in fifteen months. The best soil is a rich and rather sandy loam. It is often formed from the turf of old pastures, with dung, peat, sand, &c., thoroughly mixed. Ventilation must be freely allowed from time to time, but care must be taken to keep the atmosphere moist. A P. which has borne fruit is thrown away as useless.

There are many varieties of the P. in cultivation. Of these, some are referred by some botanists to distinct species. But the greater number of varieties are universally referred to *A. sativa*, and differ in the more or less spiny serratures of the leaves, the globular, cylindrical, or pyramidal fruit, its size, &c.

crowded in dense clusters at the top of the stem, acuminate bracts, and bearded petals, has long been a favourite garden-flower, still retaining its place alike in palace and cottage gardens. Although perennial, it is sown annually by florists, to secure fine flowers, and there are many varieties, single and double, exhibiting much diversity of colour.—The INDIAN P. or CHINA P. (*D. Chinensis*) is now also common in flower-gardens.

The Clove P. was formerly regarded as possessing medicinal properties, and was used in nervous maladies.—*Sea P.* is a common name of Thrift (*q. v.*).

PINK COLOURS, very light shades of rose-red colour: they are usually produced by extreme dilution of cochineal or carmine, Brazil and Braziletto wood colours, with whiting. Some mineral pinks for oil colours are obtained from preparations of manganese, &c. See RED COLOURS. The term pink is also applied to several Yellow Colours (*q. v.*).

PINKERTON, JOHN, an industrious and learned *littérateur*, was born at Edinburgh, 17th February 1758, and educated at the grammar-school of Lanark, where he was noted for the unusual excellence of his classical attainments, and for his hypochondriacal tendency. He was afterwards apprenticed to a Writer to the Signet, his father refusing to let him proceed to the university; and while engaged in the irksome and distasteful practice of law, he published an *Ode to Craigmillar Castle* in 1776, which he dedicated to Dr Beattie. In 1780, he went to London, where he settled as a man of letters. Next year, he gave to the public a volume of *Rimes* (as he called his pieces), and a collection of *Scottish Tragic Ballads*, followed in 1783 by a second collection of *Ballads of the Comic Kind*—both of which subsequently appeared under the title of *Select Scottish Ballads*. They professed to be ancient, but many of them were really compositions—*forgeries*, some might say, of P.'s own, and would hardly deceive a critical archaeologist. In 1784, he published an *Essay on Medals*, which went through several editions, and long held a high place among books on numismatics; and in 1785, *Letters on Literature*, marked chiefly by a novel system of orthography (e. g., the use of *a* instead of *s* in forming plurals), intended to soften the harshness of the English language, and which was abused as heartily as it deserved. These *Letters* were, however, the means of introducing him to Walpole, through whom he became acquainted with Gibbon and other literary celebrities. P.'s next publication was a most valuable one, *Ancient Scottish Poems never before in Print, from the MS. Collections of Sir Richard Maitland of Lethington, Knight* (2 vols. Lond. 1786). It was followed in 1787 by his once notable *Dissertation on the Origin and Progress of the Scythians or Goths*, in which, for the first time, appears that grotesquely virulent hatred of the Britanno-Celtic race—Scotch Highlanders, Welsh, and Irish—that reaches its climax in his *Inquiry into the History of Scotland preceding the Reign of Malcolm III.* (2 vols. Lond. 1790), where he affirms again and again, obviously with the extremest gusto, that the Highlanders are 'mere savages, but one degree above brutes;' that they are just as they were 'in the days of Julius Cæsar;' that 'like Indians and Negroes,' they 'will ever continue absolute savages,' and that 'all we can do is to plant colonies among them, and by this, and encouraging their emigration, try to get rid of them.' But in spite of this extravagant truculence of speech, the *Inquiry* contains a great deal of important matter—rare and curious historical documents, some of which are to be found nowhere else in print. P. left

England in 1802, and fixed his residence at Paris, where he died 10th March 1826, after a life of hard literary work. His principal publications, besides those already mentioned, are, *The Medical History of England to the Revolution* (1790); *Scottish Poems* (3 vols. 1792), reprinted from scarce editions; *Iconographia Scotica, or Portraits of Illustrious Persons of Scotland, with Biographical Notes* (2 vols. 1795—1797); *The History of Scotland from the Accession of the House of Stuart to that of Mary* (2 vols. 1797), valuable for its laborious investigation of original materials, but disfigured, in a literary point of view, by an imitation of the grandiose style of Gibbon; *Walpoliana*, a collection of his notes of his friend Horace Walpole's conversations, in 2 vols.; *The Scottish Gallery, or Portraits of Eminent Persons of Scotland, with their Characters* (1799); *Modern Geography* (3 vols. 1802—1807); *General Collection of Voyages and Travels* (16 vols. 1808—1813); *New Modern Atlas* (1809—1815); and *Petrology, or a Treatise on Rocks* (2 vols. 1811).

PINK ROOT. See SPIGELIA.

PINNA, a genus of lamellibranchiate molluscs of the same family with the *Pearl Mussel* (*Avicula*), and having a shell of two equal wedge-shaped valves, closely united by a ligament along one of their sides. The mantle is closed on the side of the ligament; the foot is small and conical. The byssus is remarkably long and silky; and by it the species affix themselves to submarine rocks and other bodies, sometimes even to sandy or muddy bottoms. The best known species is *P. nobilis*, a native of the Mediterranean, the byssus of which was used by the ancients for fabrics, but chiefly as an article of curiosity, to which a great value was attached. It is still so used in Sicily and elsewhere. It is very strong and lustrous. The only reason against its more general use is the difficulty of procuring it in sufficient quantity. The byssus of this species is sometimes two feet long, the shell is about the same length. Pinnae are often found in large beds, with only the edges of their shells appearing above the mud or sand. The animal is eaten.

PINNACE (from the Ital. *pinaccia*, a diminutive of *pino*, a ship) was originally a small vessel, usually schooner-rigged, employed as tender to a large ship, for the purpose of communicating with the shore, &c. At present, however, the signification is limited to a large boat carried by great ships. It is smaller than the launch, but larger than the cutters; and is generally rowed 'double-banked,' by from ten to sixteen oars.

PINNACLE, an ornamental termination much used in Gothic architecture. It is of simple form in the earlier periods of the style, having a plain square or octagonal shaft and sloping roof or top, terminating with a finial; but in later examples the pinnacle is greatly developed, and becomes one of the most varied and beautiful features of the style. It is ornamented with shafts bearing canopies, and niches filled with statues. Pinnacles are most frequently used on buttresses and parapets, and when placed over the former, serve as a deadweight to increase their power of resisting a thrust.

PINNULE, in Botany, a leaflet of a pinnate leaf, or of one which is bipinnate, tripinnate, &c. See LEAVES. The term is more frequently used, however, to designate the ultimate divisions of the fronds of ferns, when divided in the same manner.

PINSK, a town of West Russia, in the government of Minsk, surrounded by vast marshes called the Pinsk Marshes, stands on the banks of the Pina, a branch of the Pripiet, 752 miles south-south-

surmised that the benefit was in some sort reciprocal, and that, by her affectionate reverence and solicitude for her sage, she a little consoled herself for the gentlemanly indifference of her husband. On the death, in 1781, of her husband, Mrs Thrale retired with her four daughters to Bath, where, in 1784, she married Mr Gabriel Piozzi, an Italian teacher of music. This *mésalliance*—as it was held—was deeply censured by all her friends, and so unreasonably excited the ire of Dr Johnson in particular, that a rupture of friendly relations was the result. In the correspondence between them on the subject, it must be admitted the lady has much the better of the philosopher, whose tone of unmannerly rudeness gives some countenance to the good-natured suspicion of his friends, that he had an eye to the widow himself. Though the feud was ostensibly healed, the friends never again met; Mrs P. leaving England for Italy with her husband, and Dr Johnson dying soon after. Some little time subsequent to his death, she published an octavo volume, entitled *Anecdotes of Dr Samuel Johnson during the last Twenty Years of his Life*, in which it seemed to the indignant Boswell and others, that her main intention was to take her little feminine revenge on the deceased for his outrage in the matter of Piozzi. This work she supplemented in 1788 by a collection of *Letters to and from Dr Samuel Johnson*, in 2 vols. 8vo. Of works more properly her own, may be mentioned, *Observations and Reflections made in the course of a Journey through France, Italy, and Germany* (2 vols. 8vo, 1789); *British Synonymy, or an Attempt at regulating the Choice of Words in Familiar Conversation* (2 vols. 8vo, 1794); and *Retrospection, or a Review of the most striking and important Events, Characters, Situations, and their Consequences, which the last Eighteen Hundred Years have presented to the View of Mankind* (2 vols. 4to, 1801)—books long since utterly forgotten, if ever they were at all read and remembered. Having survived her second husband, her own celebrity, and almost in some sort that of the great Dr Johnson, with whom her name remains indissolubly connected, Mrs P. died at Clifton, near Bristol, on the 2d May 1821.

PIPA, a genus of batrachians, in general form resembling frogs and toads, and characterised by the very broad and triangular head, the sides of which are destitute of the glands (*parotoïds*) so large in the true toads; the eyes small, and situated near the margin of the lower jaw; the ear concealed beneath the skin; the tongue merely rudimentary; the jaws destitute of teeth; the fore-feet not webbed, but divided into four fingers, each of which divides at the extremity into four small points, these, again, being minutely divided in a similar manner; the hind-feet five-toed and completely webbed; the larynx of the male extremely large—a triangular bony box, within which are two small movable bones for occasionally closing the entrance of the bronchi; the back of the female furnished with numerous cells or pouches, in which the eggs are hatched, and the young undergo all their transformations till they have attained a form similar to that of their parents. These characters are so remarkable as to make the creatures of this genus objects of peculiar interest, but particularly the mode of rearing the young. It was at first supposed that the young were produced in some unusual way in the cells from which they were seen finally to emerge; but this is not the case. The eggs are deposited by the female in the ordinary manner, and are carefully placed by the male in the cells of her back, which close over them. When the young are ready to use their limbs, they struggle out of the cells, to which they never afterwards

return. The best-known species of P. is that commonly called the Surinam Toad (*P. Surinamensis*), a native of Guiana and other warm parts of continental America, where it inhabits swamps and ditches, and is occasionally found in damp and dirty corners of houses. It is sometimes seven inches long; its colour is brownish-olive above, whitish below; the skin covered with small hard granules, mingled with occasional horny tubercles. The whole aspect of the creature is peculiarly hideous.

PIP. See POULTRY.

PIPE, a measure of quantity commonly employed in Portugal, Spain, France, and in some other countries which trade with these. It is used almost exclusively for wine and oil, and has a particular value for almost each locality. The pipe is called in England a butt, and is equal to two hogheads, or half a tun. The pipe of Oporto is larger than those of Lisbon and of Spain in the proportion of 93 to 76. There are three different measures of this name in France; and there was formerly a pipe, a measure of capacity for dry goods, in use by the Bretons. But the pipe in England varies with the description of wine it contains: a pipe of port contains 114 imperial gallons; of sherry, 108 imperial gallons; and of madeira, 92 imperial gallons; while the common English pipe contains 126 wine gallons, or 105 imperial gallons nearly.

PIPECLAY is a fine Clay (q. v.), free from iron and other impurities, having a grayish-white colour, a greasy feel, and an earthy fracture. It adheres strongly to the tongue, and is very plastic, tenacious, and infusible. It is used for the manufacture of tobacco-pipes and white pottery. The localities where it is chiefly obtained are Devonshire, and the Trough of Poole in Dorsetshire. It is also found in various places in France, Belgium, and Germany.

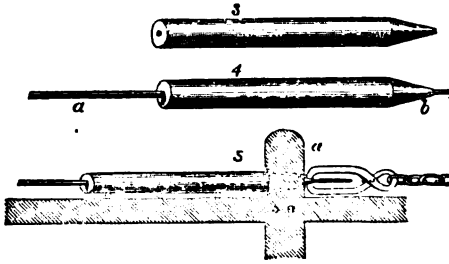
PIPE-FISH (*Syngnathus*), a genus of ossiferous fishes of the order *Lophobranchii* (q. v.), and of the family *Syngnathidae*. In this family the form is elongated, there is little flesh, and the body is almost covered with partially ossified plates; the head is long; the jaws are elongated so as to form a tubular snout—whence the names P. and *Syngnathus* (Gr. *syn*, together; and *gnathos*, a jaw); and the males have pouches, variously situated, in which they receive the eggs of their mate, and carry them till they are hatched. The family *Syngnathidae* is sometimes restricted to those in which the egg-pouch



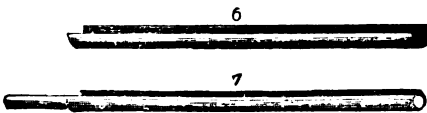
Pipe-Fish (*Syngnathus acus*).

of the males is on the tail, and is open throughout its whole length, and the tail is not prehensile. Thus restricted, it contains a number of genera, of which one only, *Syngnathus*, is British.—One of the most common British species is the GREAT P. (*Syngnathus acus*), which is sometimes found in deep water, and sometimes at low tide among the sea-weed in rock-pools. The specimens commonly seen are from 1 foot to 16 inches in length; but this fish is said to attain

brought to the drawing-table, and here the small end with its projecting mandrel is put into a funnel-shaped hole, drilled through a steel post (a, fig. 5),



so as to allow the point to be gripped on the other side by a pair of pincers, at the end of a strong chain; the machine-power is then applied to the other end of the chain, and the soft metal and its mandrel are drawn through, the former being extended equally over the surface of the latter, which is then removed, and the length of pipe is complete. Some metals require repeated drawing through holes, getting gradually smaller, and have to be softened or annealed at intervals, as the metal hardens under repeated drawing. In this way, brass, copper, tin, and pewter pipes are made; and a patent has just been taken out for making steel ones; but lead pipes are made of great lengths by squeezing the soft metal through a hole in a steel plate in which there is a fixed core or mandrel projecting, which forms and regulates the size of the bore of the pipe. Pipes are also made from copper, brass, and malleable iron by rolling out narrow strips of metal, and then passing them successively through rollers, which are deeply grooved, and which turn up the edges (fig. 6). A mandrel is then laid in it, as in fig. 7, and it is next passed through double-grooved rollers, which turn the edges in, and thus form a complete tube round the



mandrel. The edges, however, require soldering or welding, if of iron. All boiler tubes used to be made in this way; but the method of drawing has lately been so much improved, that copper and brass pipes, or tubes, as they are frequently called, are now drawn of considerable thickness and diameter.

PIPE-STICKS. It is usual to call the wooden tubes used for some tobacco-pipes by this name; and unimportant as it may at first sight appear what the tube is made of, there is great difference of taste in this respect; and great care is taken by some smokers to get what they consider the choicest material. Perhaps the most prized are the Agriot or Cherry pipe-sticks of Austria. These are the young stems of the Mahaleb Cherry (*Prunus Mahaleb*), which is extensively grown for the purpose in the environs of Vienna. An astonishing amount of care is bestowed on the cultivation of these shrubs, which are all raised from seed. When the seedlings are two years old, they are each planted in a small pot, and as they continue to grow, every attempt at branching is stopped by removing the bud. As they increase in size from year to year, they are shifted to larger pots or boxes, and great care is taken to turn them round almost daily, so that every part is

equally exposed to the sun. When they have attained a sufficient height, they are allowed to form a small bushy head, and continue to receive the same attention in daily turning, &c., until they are thick enough in the stem. They are then taken up, and the roots and branches removed, and the stem put by to season. Afterwards, they are bored through, and are ready for use. These pipe-sticks have an agreeable odour, and are covered with a reddish-brown bark, which is retained. Sometimes they are five feet in length, and as smooth and straight as if turned. When of such a length, they command high prices. In Hungary, pipe-sticks made from the stems of the Mock Orange (*Philadelphus coronarius*) are much used; and the jessamine sticks of Turkey are in great esteem in all countries. Orange and lemon-trees and ebony are also used. The chief recommendation of these materials seems to be in the power of the wood to absorb the oil produced in smoking tobacco, and consequently to render the smoke less acrid. See TOBACCO-PIPES.

PIPI, the name given to the ripe pods of *Casipinia Papai* (see *CESALPINIA*), which are used in tanning, and are not unfrequently imported along with Dividivi (q. v.), and sometimes separately, but not to any considerable extent, being very inferior to dividivi. They are easily distinguished from the pods of dividivi, not being curved as they are, but straight.

PIPING CROW. See *BARITAE*.

PIT, TITLING, or TITLARK (*Anthus*), a genus of birds included by Linnaeus among Larks (*Alauda*); but now regarded as forming even a distinct family, *Anthidae*, which is ranked among the *Dentirostres*, whilst the lark family (*Alaudidae*) is ranked among the *Conirostres*. The bill is more slender than in larks; the tips of the mandibles slightly bent downwards and notched. The hind-claw is long, although not so long as in larks, and more or less curved. The plumage resembles that of larks; in habits and motion of the tail, there is a greater resemblance to wagtails. The bill is not strong enough for feeding on grain or hard seeds, and insects and worms are the principal food of pipits. The most common British species is the *Meadow P.*, *COMMON TITLARK*, or *TITLING* (*A. pratensis*), familiarly known in many parts of England and of Scotland as the *Moss-cherper*. It is found in almost all parts of Europe, and the north of Asia, in Western India, in Japan, and in Iceland. It is a small bird, its colour brown of various shades. It frequents heaths, mosses, and pastures; and usually makes its nest on a grassy bank, or beside a tuft of grass or heath. Its song is weak and plaintive, and it generally sings in the air. It is gregarious in winter. The cuckoo is said to deposit its egg more frequently in the nest of the Meadow P. than in that of any other British bird.—A rather larger British species is the *TREE P.*, or *FIELD TITLING*, which has a shorter claw, and perches on trees, frequenting enclosed and wooded districts. It is a summer visitant of Britain, and most common in the south of England. It occurs in most parts of Europe, in Asia, and the north of Africa.—The *Rock P.*, or *SEA TITLING* (*A. petrosus*), is to be found on the shores of all parts of Britain and Ireland. It is rather larger than the Tree P., and has a long curved hind-claw. It feeds chiefly on small marine animals, seeking its food close to the edge of the retiring tide.

PIPPIN (so called probably because raised from the pip, or seed), a name given to many varieties of apple, among which are some of the finest in cultivation, as the *Golden P.*, *Ribston P.*, &c. The

kind of bait will do; but they at once cut through any line, and the line must therefore be cased above the hook in tin-plate. The Indians often shoot them with arrows.

PIRMASENS, a small town of the Bavarian Palatinate, and formerly the chief town of the county of Hanau-Lichtenberg, 22 miles west of Landau. It has 6735 inhabitants, who manufacture shoes and musical instruments.

PIRNA, a small town of Saxony, stands on the left bank of the Elbe, 11 miles by railway south-east of Dresden. It is surmounted by a hill, crowned by a castle, now used as a lunatic asylum, contains a beautiful parish church, and a number of important benevolent institutions. The manufacture of stoneware employs many hands. Pop. about 6000.

PISA, one of the oldest and most beautiful cities of Italy, and, till lately, the capital of the now extinct grand-duchy of Tuscany, is situated in a fruitful valley, on the banks of the river Arno, which intersects the city and is spanned by three noble bridges. P. is situated in 43° 43' N. lat., and 11° 24' E. long. The population was, in 1862, 51,057. It has broad, straight, well-paved streets, and several fine squares. Among its 80 churches, the most worthy of notice is the cathedral, or *Duomo*, begun in 1068, and completed in 1118, with its noble dome, supported by 74 pillars, and its fine paintings, variegated marbles, and painted windows. Near the cathedral stands the round marble belfry known as the Leaning Tower of Pisa, from the circumstance that it deviates about 14 feet from the perpendicular. This celebrated building, which is 180 feet in height, and consists of seven stories divided by rows of columns, and surmounted by a flat roof and an open gallery commanding a splendid view of the surrounding country, was erected in the 12th c. by the German architect Wilhelm of Innsbruck. The Baptistery, or Church of St John, opposite the cathedral, an almost equally remarkable structure, was completed in 1162 by Diotisalvi. The main building, which is circular, and raised on several steps, supports a leaden-roofed dome, having a second dome above it, surmounted by a statue of St John. The beautifully proportioned interior, noted for its wonderful echo, contains a pulpit, which ranks as the greatest masterpiece of Nicola Pisano, various pieces of sculpture, and a large octagonal marble font. The Campo-Santo, or ancient national cemetery, dates from the year 1228, when the Pisans caused earth to be brought from Jerusalem for the graves of the most distinguished citizens of the republic. In 1283, the ground was surrounded by cloisters, the walls of which were adorned by fresco-paintings, now nearly obliterated, although some of these works of art, which are chiefly by Giotto, Veneziano, Orcagni, and Memmi, still retain traces of their original beauty. Among the other public buildings of P., special notice is due to the churches of La Madonna della Spina and San Stefano, both rich in paintings and sculptures, and the latter famous for its organ, the largest in Italy; the grand ducal and Lanfranchi palaces; the Torre della Fame, so called from its being supposed to have been the spot in which Ugolino Gherardesca and his children were starved to death in 1288; the university, founded in 1330, and restored by Cosmo I. de' Medici, which enjoyed a high reputation in the middle ages, and still possesses claims to consideration in its library, botanical garden, observatory, and affiliated schools and art collections, &c. The population of P., which, in the 13th c., amounted to 150,000, had fallen, in the present century, to less than one-sixth of that number; but of late years, trade and

industrial arts have made a rapid advance, and the population has increased in proportion. In the neighbourhood of P., at the foot of San Giuliano, lie the mineral baths, whose fame was known to Pliny, and which continued through the middle ages to attract sufferers from every part of Italy. The waters, which are rich in carbonic acid and chloride of sodium, are found efficacious in various arthritic and rheumatic affections.

History.—Ancient P., like other Etruscan cities subject to Rome, retained its municipal government, and enjoyed an almost unlimited freedom while nominally under Roman protection; but, on the decline of the imperial power, it was compelled to submit in turn to the various transalpine nations who successively overran Northern Italy. Early in the 11th c., P. had risen to the rank of a powerful republic, whose sway included the then fertile district known as the Maremma di Lerici, and which yielded little more than nominal homage to its suzerain lords, the emperors of Germany. Throughout the 11th c., P. was at the height of its prosperity, and to this period belong most of the splendid monuments of art that still adorn the city. Its troops took part in all the great events of the Holy Land; and its fleet in turn gave aid to the pope in Southern Italy, to the emperor in Northern France, chastised the Moors, and exacted its own terms from the Eastern emperors. In their wars with the Saracens of Sardinia, the Pisans had conquered Sardinia, Corsica, and the Balearic Islands, and for a time maintained their ground against their hereditary enemies, the Genoese; but having sided with the Ghibellines in the long wars which desolated the empire, P. suffered severely at the hands of the victorious Guelphic party. Indeed, the rivalry of the Guelphic cities of Florence, Lucca, and Siena, nearly brought P. to the brink of ruin at the close of the 13th c.; and after struggling for more than a hundred years against external foes and the internal dissensions between the democratic mob and the Ghibelline nobles, without losing their character for indomitable valour, the Pisans finally threw themselves under the protection of Galeazzo Visconti of Milan. The son of the latter sold the Pisan territory to their greatest enemies, the Florentines, from whose tyrannical rule it was for a time relieved by Charles VIII. of France, who, in 1494, accepted the protectorate of the city. When the French left Italy, the old struggle was renewed; and after offering a desperate resistance, the Pisans, in 1509, were compelled by hunger to surrender the city to the Florentine army besieging the walls. The most influential families, as formerly in 1496, when P. first lost her independence, preferred emigration to subjection, and removed to Sardinia and Sicily, since which time, P. has remained incorporated with the Florentine territories of Tuscany.

PISA, COUNCIL OF, one of the councils commonly reputed by Roman Catholics as oecumenical or general, although some, especially of the Ultramontane (q. v.) school, do not look upon it as such. It was assembled in the time of the great Western Schism, for the purpose of restoring the peace of the church, and the unity which had been interrupted by the rival claims of two competitors for the papacy. The history of this rival claim will be found under the head **WESTERN SCHISM**. For our present purpose, it is enough to state that the adherents of both the claimants of the see of Rome—those of Gregory XII., as well as those of Benedict—agreed on the necessity of a general council, as the only means of putting an end to the schism; and the rival popes having themselves either evaded or declined the demand, the cardinals of both united in issuing letters of convocation, and in summoning

which would otherwise prevent the fish from growing rapidly or to a good size.

The greatest improvement in pisciculture, and a most important branch of it, to which the term is often restricted, is the breeding of fish in artificial breeding-places, from which not only ponds but rivers may be stocked; or the art of fecundating and hatching fish-eggs, and feeding and protecting the young animals till they are of an age to secure their own food, and protect themselves from their numerous enemies. As at present conducted, pisciculture has become in many instances a profitable branch of industry; and the art has been employed in France with great success for replenishing with fishes many of the most important streams that had become barren through over-fishing; in Britain, also, this artificial system has become a profitable adjunct of one or two of our larger salmon-fisheries.

Modern pisciculture is the revival of an old art well known to the ancient Italians, but which had fallen into abeyance for a number of centuries. The art of breeding and fattening fish was well known to the luxurious Romans, and many stories are told about the fanciful flavours which were imparted to such pet fishes as were chosen for the sumptuous banquets of Lucullus, Sergius Orata, and others. The art had doubtless been borrowed from the ingenious Chinese, who are understood to have practised the art of collecting fish-eggs and nursing young fish from a very early period. Fish forms to the Chinese a most important article of diet; and from the extent of the water-territory of China, and the quantities that can be cultivated, it is very cheap. The plan adopted for procuring fish-eggs in China is to skim off the impregnated ova from the surface of the great rivers at the spawning season, which are sold for the purpose of being hatched in canals, paddy-fields, &c.; and all that is necessary to insure a large growth of fish is simply to throw into the water a few yolks of eggs, by which means an incredible quantity of the young fry is saved from destruction. Although all kinds of fish are enormously fecund, it is well known to naturalists that only a small percentage of the eggs ever come to life, and of the young fish, very few ever reach the table as food. So many of the eggs are destroyed by various influences, and so many likewise escape impregnation, that if we are to keep up our fish supplies, pisciculture, or protected breeding becomes absolutely necessary.

Commercial pisciculture, as at present carried on, owes its origin to the French, the art having been first put in practice by M. Remy, a poor fisherman, who gained a living by catching fish in the streams of La Bresse in the Vosges. This re-discovery of the lost art of fish-breeding is understood to have been quite accidental on the part of Remy, although it is thought by some zealous Scotchmen that the Frenchman must have heard of the experiments of Mr Shaw of Drumlanrig, who, for a few years previous to Remy's discovery, had been trying to solve some problems in the natural history of the salmon by means of the artificial system. The art had also been partially revived in Germany about the middle of last century by a gentleman of the name of Jacobi, who practised the artificial breeding of trout. Whether or not Remy had heard of either of these experimenters, it is certain that to him we owe the revival of the art in its larger or commercial sense; the others only used it as an adjunct to their study of the natural history of fishes. In one sense, fish-culture was largely practised in this country long before the discovery by Remy of the system of artificial fecundation—we allude to the fact of there being large numbers of private ponds and stewes in which country gentlemen bred fish for the

use of their own tables, as well as similar places attached to monasteries and other religious edifices, in which fish were grown for fast-day uses. The range of fish suited for pond-breeding was very limited; and to render them at all good in flavour, expensive food had to be obtained for them, and they had to be served up accompanied by expensive sauces. It is probable that some of our rarest fishes were introduced into this country during these old monastic times, such as the Lochleven trout, the vendace, &c.

It was the great waste of eggs incidental to the natural system of fish-breeding that led Remy, about 1842, in conjunction with Gehin, a coadjutor whom he assumed as a partner, to try what he could do in the way of repeopleing the fish-streams of his native district. His plan being at once successful, attracted the favourable notice of many of the French savans, and led to rewards and preferment for Remy; the new art was taken under the protection of the government; and now, after the experience of twenty years, artificial fish-culture has been so perfected in France that there has arisen at Huningue, near Basel, on the Rhine, a gigantic fish-nursery and egg-dépôt for the supply of eggs, and the dissemination of the art both in France and other countries. The place is fitted up specially for this purpose with egg-boxes and reservoirs; and millions of eggs are annually received, and sent to Germany, Spain, England, and other places. A drawing is given on the next page of one of the halls of this interesting establishment.

The course of business at Huningue is as follows: the eggs are chiefly brought from the streams of Switzerland and Germany, and embrace those of the common trout, as well as the Rhine and Danube salmon, and the tender charr or ombre chevalier. People are appointed to capture gravid fish of these various kinds, and, having done so, to communicate the fact to Huningue. An expert is at once sent to deprive these fishes of their spawn, and bring it to the breeding or resting boxes, where it is carefully tended till it is ready to be despatched to some district in want of it. It is, of course, much more convenient to send the eggs than the young fish, as the former, nicely packed among wet moss in little boxes, can be carried to a distance with greater facility. The mode of artificially spawning a salmon is as follows. It should, of course, be ascertained that the spawn is in a perfectly matured state, and that being the case, the salmon is held under water in a large tub, while the hand is gently passed along its abdomen, when, if the ova be ripe, the eggs will flow out like so many pease. The eggs are then carefully washed, and the water is poured off. The male salmon is then handled in a similar way, when the contact of the milt immediately changes the eggs into a brilliant pink colour. After being again washed, they may be ladled out into the breeding-boxes, and left to come to life in due season. The period occupied in hatching is different in different climates. At Stormontfield, where the eggs have no shelter, the usual period is about 135 days; but salmon ova have been known to burst in about half that period, and to yield very healthy fish. Great care is of course necessary in handling the ova. The eggs manipulated at Huningue are all carefully examined on their arrival, when the bad ones are thrown out, and those that are good are counted and entered in a record. The ova are watched with great care, and from day to day all that become added are removed. The applications for eggs, both from individuals and associations, are always a great deal more numerous than can be supplied; and before second applications can be

PISCICULTURE.

entertained, it is necessary for the parties to give a detailed account of how their former efforts succeeded. It may be interesting to note, as regards the cost of pisciculture at Huningue, that the most expensive fish is the ombre chevalier. Of some species, as many as sixty or seventy per cent. of the

Reception hall for Fish-eggs at Huningue.

eggs are lost. The general calculation, however, is twelve living fish for a penny.

The total number of all kinds of fishes distributed from Huningue, during the first ten years was upwards of 110 millions! See HUNINGUE.

A very successful effort in pisciculture has been carried out in connection with the salmon-fisheries of the river Tay. At Stormonthfield, near Perth, a series of ponds have been constructed, and a range of breeding boxes laid down capable of receiving 300,000 eggs; and in a large addition to their rental, the proprietors of the Tay fisheries are reaping the reward of their enterprise. The operations at Stormonthfield were begun in 1853, and from the end of November till the end of December, 300,000 ova were deposited, and these coming to life in April 1854, remained in the boxes and ponds one half for one year, and the other moiety for two years before they assumed the scales of the smolt, and were seized with the migratory instinct. See SALMON. Every two years since the completion of the ponds, a brood has been obtained, and upwards of one million of salmon have by means of these ponds been added to the fish stock of the river Tay, so as considerably to enhance the value of the fisheries. Another pond (there was only one originally) has now been added to the suite, for the purpose of holding the second-year parra, so that a brood of 300,000 will now be obtained annually. At several other places in Scotland, the artificial system is being introduced as an adjunct to the natural breeding resources of different rivers.

The art of pisciculture has also been introduced into Ireland, at the fisheries of Loughs Mask and Carra, by the Messrs Ashworth, who have obtained excellent practical results from their enterprise. These lochs contain an area of water equal to thirty-five acres; and a communication with the sea having been opened, they now teem with salmon; and the proprietors are confident that it is as easy and as profitable to cultivate salmon as sheep. The latest experiment in fish-culture with the salmon consists in the introduction of that fish into Australia and Tasmania. Impregnated eggs carefully packed in ice were sent out in a fast-sailing ship, and were at once transferred to a suitable river, where (1864) they burst into life, with every prospect of becoming naturalised in that vast continent.

A series of piscicultural experiments have been very successfully carried on in the upper waters of the Thames, and the salmon has been bred along with various other fishes, upwards of 120,000 fishes having been added to the stock of the river; but the success of this experiment yet remains to be determined, as it is not certain whether the salmon will be able to penetrate to the sea, in consequence of the lower Thames being used as the sewer of London.

This branch of pisciculture has begun to be prosecuted to some extent in several countries of Europe, and has been deemed of sufficient importance to demand the attention of governments. It is probable that the attention turned to the whole subject of pisciculture, and the example of the transportation of salmon to Australia, may lead to

the introduction of valuable kinds of fishes into waters where they are now unknown. The grayling has thus already been introduced into the Clyde and Tweed. There is no apparent reason why every valuable fresh-water fish of Europe should not be plentiful in Britain.

The French government are now extending the system of artificial culture to some kinds of sea-fish and to many of the larger crustaceans. See OYSTER. At Comacchio (q. v.), on the Adriatic, a curious industry is carried on in the cultivation of eels; and in the Bay of Aiguillon, there is an ancient mussel-farm in which large quantities of that shell-fish are annually grown from the seed, and turned to very profitable account. There is no practical difficulty, it is said, in rendering an acre of water as productive as an acre of land.

PISCINA, the large basin (or pond) in the Roman therma, containing tepid water, in which the bather might swim.

PISCINA, a shallow stone basin with a drain (usually leading directly to the earth), in Roman Catholic churches, in which the priest washes his hands, and for rinsing the chalice at the celebration of the mass. In England, it is almost invariably placed on the

Piscina, Warrington.

south side of the choir, at a convenient height. **PISÉ**, a kind of work used instead of brick, &c., for the walls of cottages. It consists of loam or earth hard rammed into framing, which, when dry, forms a wall.

PÍSEK (Boh. *Písek*, sand), a small town of Bohemia, on the right bank of the Wottawa, an affluent of the Moldau, stands on a sandy plain (from which circumstance it probably received its name) 55 miles south-south-west of Prague. The town is old, and contains the remains of a royal castle. Among other institutions are a school of arts and a high school. The manufactures are woollen and cotton fabrics, iron wire, and musical instruments. Pop. 6100.

PISHAMIN. See DATE PLUM.

PISOLITE (Gr. pea-stone), a concretionary limestone, differing from oolite in the particles being as large as peas.

PISTACIA, a genus of trees of the natural order *Anacardiaceae*, having dioecious flowers without petals, and a dry drupe with a bony stone.—The **PISTACHIO TREE** (*P. vera*) is a small tree of about 20 feet high, a native of Persia and Syria, but now cultivated in all parts of the south of Europe and North of Africa, and in many places naturalised. It has pinnate leaves, with about two pair of ovate leaflets, and an odd one; flowers in racemes; fruit ovate, and about the size of an olive. The stone or nut splits into two valves when ripe; the kernel, which is of a bright green colour, is very oleaginous, of a delicate flavour, and in its properties very much resembles the sweet almond. In the south of Europe and in the East, *Pistachio* nuts are much esteemed; but as they very readily become rancid, they are little exported to other countries. They are sometimes called *Green Almonds*. Oil is expressed from them for culinary and other uses. In cultivation, one male tree is allowed to

five or six fertile ones. The tree produces flowers and even fruit readily enough in the south of England, but the summers are not warm enough to ripen the fruit, and the tree is apt to be destroyed by a severe frost.—The **MASTIC TREE**, or **LESTIK** (*P. lentiscus*), yields the gum-resin called *Mastic* (q. v.). It is a native of the countries around the Mediterranean.—The **TERPENTINE TREE** (*P. teredintus*) yields the Turpentine (q. v.) known in commerce as *Cyprus Turpentine*, *China Turpentine*, or *Scio Turpentine*, which is of a consistency somewhat like that of honey, a greenish-yellow colour, an agreeable odour, and a mild taste, and in its properties resembles the turpentine of the Conifers, but is free from acidity. It is obtained by making incisions in the trees, and placing stones for the turpentine to flow upon, from which it is scraped in the morning, before it is liquefied again by the heat of the sun. The tree is about 30 or 35 feet in height; and has pinnate leaves, of about three (or of leaflets and an odd one; the flowers in compound racemes, the fruit nearly globular. The kernel of the fruit is oleaginous and pleasant.—The **BAYON TREE** (*P. Atlantica*), a round-headed tree of about 40 feet in height, a native of the north of Africa, produces a fruit much used by the Arabs; and a gum-resin of pleasant aromatic smell and agreeable taste, which exudes from its stem and branches, is chewed to clean the teeth and impart a pleasant smell to the breath.—The fragrant oil of the kernels of *P. oleosa*, a native of Cochinchina, is used by the people of that country to impart a perfume to ointments.

PISTIL, in Botany, the female organ of fructification in phanerogamous plants; that part of the Flower (q. v.) which, after flowering is over, is developed into the fruit. There is sometimes one pistil in a flower, sometimes more; in some flowers, which have numerous pistils, they form a number of whorls, one within another, sometimes on an elevated receptacle or elongated axis, or, more rarely, they are spirally arranged. In every case, the centre of the flower is occupied by the pistil or pistils, if present. See FLOWER. A pistil is either formed of a single Carpel (q. v.), as is the case when there are numerous pistils, or of several carpels combined; and the number of carpels of which the pistil is formed is often indicated by the number of the cells of the germen, or by its lobes or angles. The pistil usually consists of a Germen (q. v.) or ovary, in which the Ovules (q. v.) are contained, and which is surmounted by a *stigma*, either immediately or through the intervention of a *style*; but in Gymnogens (q. v.), there is neither germen, style, nor stigma, the female organs of fructification being mere naked ovules. The germen is always the lowest part of the pistil. The stigma exhibits an endless variety of forms, and is adapted to the reception and retention of the pollen grains requisite for fecundation, partly by the roughness of its surface—which is of a somewhat lax cellular tissue, covered with projecting cells, often in the form of minute warts, and often elongated into hairs—and partly by the secretion of a viscons fluid. The stigma when it is *sessile*—or seated immediately on the germen—is supported by the style, which rises from the germen, and on the top of which the stigma is generally placed. The style is sometimes very long and slender, sometimes very short; the germen sometimes passes imperceptibly into the style, and sometimes the style rises from it abruptly; and similar differences appear in the relations of the style and stigma; the stigma, however, may be regarded as always an expansion of the top of the style, although it is sometimes, but rarely, situated on one or both sides of the style, beneath its summit. In like

13s. 9d.; of Venice = 16s. 2½d.; of Florence and Parma = 16s. 10½d.; and the old coin of Piedmont = 11, 2s. 7½d., or 24 old liras. These will, however, in all probability, be soon superseded by the new pistole of 20 liras, or francs, which is equivalent to 16s. sterling. Gold coins of this name are current in Hesse-Cassel, Switzerland, Brunswick, and Hamburg, but are in most cases merely convenient multiples of the ordinary thaler and guilder.

PISUM. See **PEA**.

PIT, in Gardening, is an excavation in the ground, intended to be covered by a Frame (q. v.), and to afford protection to tender plants in winter, or for the forcing of vegetables, fruits, &c. Pits are often walled on all sides, although, in many cottage gardens, excellent use is made of pits which are mere excavations. The walls are often raised above the ground, particularly the back wall, the more readily to give slope to the glazed frame. A pit in which no artificial heat is supplied, is called a *cold pit*; but when forcing is intended, flued pits are often used. Artificial heat is sometimes also given by means of fermenting matter. The ventilation of pits, as much as the weather will permit, is of the greatest importance.

PITA-HEMP, one of the names of the Agave or Aloe fibre. See **AGAVE**.

PIT'AKA (literally, 'basket') is, with the Buddhists, a term denoting a division of their sacred literature, and occurs especially in combination with *tri*, 'three'; *tripit'aka* meaning the three great divisions of their canonical works, the *Vinaya* (discipline), *Abhidharma* (metaphysics), and *Sūtra* (aphorisms in prose), and collectively, therefore, the whole Buddhist code. The term 'basket' was applied to these divisions, because the palm-leaves on which these works were written were kept in baskets, which thus became a part of the professional utensils of a Bhikshu, or religious mendicant.

PITCAIRN ISLAND, a solitary island in the Pacific Ocean, lying at the south-eastern corner of the great Polynesian Archipelago, in lat. 25° 3' 6" S., and long. 130° 6' W. Its length (2½ miles) is about twice its breadth, and the total content is approximately 1½ square miles; so that, except from its being the only station (with the exception of the Gambier Islands) between the South American coast and Otaheite at which fresh water can be procured, it would be too insignificant to deserve notice, were it not for the manner in which it was colonised. The island is wholly surrounded by rocks; it has no harbour, and its soil is not very fertile. It was occupied in 1790 by the mutineers of the *Bounty* (see **BLIGH, WILLIAM**), who, after touching at Toobouai, sailed for Tahiti, where they remained for some time. Christian, the leader of the mutineers, however, fearing pursuit, hastened their departure; and after leaving a number of their comrades who preferred to stay on the island, they brought off with them 18 natives, and sailed eastward, reaching P. I., where they took up their residence, and burned the *Bounty*. They numbered then 9 British sailors—for 16 of the sailors had preferred to remain at Tahiti, and of these, 14 were subsequently captured, and (September 1792) three of them executed—and 6 Tahitian men, with 12 women. It was impossible for concord to subsist in a band of such desperate character; and, in the course of the next ten years, all the Tahitian men, all the sailors, with the exception of Alexander Smith (who subsequently changed his name to John Adams), and several of the women, had died by violence or disease. From the time of their leaving Tahiti, nothing had been heard of them, and their fate was only known when an American, Captain

Folger, touched at P. I. in 1808, and on his return, reported his discovery to the British government; but no steps appear to have been taken by the latter. On September 17, 1814, a British vessel, the *Britain*, called at the island, and found old Adams still alive, commanding the respect and admiration of the whole little colony, by his exemplary conduct and fatherly care of them. Solitude had wrought a powerful change in Adams; and his endeavours to instil into the young minds of his old companions' descendants a correct sense of religion, had been crowned with complete success, for a more virtuous, amiable, and religious community than these islanders, had never been seen. They were visited by British vessels in 1825 and 1830, and the reports transmitted concerning them were fully corroborative of the previous accounts; but, in 1831, their numbers (57) had become too great for the island, and at their own request, they were transported to Tahiti in the *Lucy Ann*, by the British government. But, disgusted at the immorality of their Tahitian friends and relatives, they chartered a vessel, defraying the cost of it in great part with the copper bolts of the *Bounty*, and most of them returned to P. I. at the end of nine months. In 1839, being visited by Captain Elliot of H.M.S. *Fly*, they besought to be taken under the protection of Britain, on account of the annoyances to which they had been subjected by the lawless crews of some whale-ships which had called at the island; and, accordingly, Captain Elliot took possession of it in the name of Her Majesty, gave them a Union Jack, and recognised their self-elected magistrates as the responsible governor. He also drew up for them a code of laws, some of which are amusing from the subjects of which they treat, but the code was of great use to the simple islanders. From this time, they were frequently visited by European ships; and, in 1855, finding their numbers again too great for the island, they petitioned government to grant them the much more productive Norfolk Island, to which they were accordingly removed in 1856. In 1859, however, two families, numbering in all 17, returned to P. I., reducing the number of those left on Norfolk Island to 202. From their frequent intercourse with Europeans, the Pitcairn Islanders have, while still retaining their virtuous simplicity of character and cheerful hospitable disposition, acquired the manners and polish of civilised life, with its education and taste. They are passionately fond of music and dancing, the latter evidently a legacy from their maternal ancestry. The men are engaged in whaling and herding cattle, or in cultivating their gardens and plantations; while the women (who seem to be the more industrious class) attend to their families, manage the dairies, and take an occasional part in field-labour.

P. I. was first discovered by Carteret in 1767, and was named by him after one of his officers; but it was never visited by Europeans till taken possession of by the mutineers, though the latter found satisfactory indications of its having previously been occupied for a considerable period by savages probably from the neighbouring islands.

PITCH. The common kind of pitch is the black residue which remains after distilling wood-tar. See **TAR**. It is made extensively in Russia, Norway, and North America. It is a most useful material for protecting wood from the action of water, hence it is used for calking the seams, and coating the outsides of ships and boats; it is also applied to the inside of water-casks, and many similar uses. A variety of pitch is now obtained from the distillation of coal-tar, and another from bone-tar: the latter is said to be nearly equal in

that the gods having offended Brahmā by neglecting to worship him, were cursed by him to become fools; but upon their repentance, he directed them to apply to their sons for instruction. Being taught accordingly the rites of expiation and penance by their sons, they addressed the latter as fathers, whence the sons of the gods were the first Pitṛis (fathers). See Wilson's *Viṣṇu-Purāṇa*. Manu enumerates various classes of Pitṛis in defining those who were the ancestors of the gods, those who were the ancestors of the demons, and those from whom proceeded the four castes severally; but he adds, at the same time, that these are merely the principal classes, as their sons and grandsons indefinitely must likewise be considered as Pitṛis. The *Purāṇas* divide them generally into seven classes, three of which are without form, or composed of intellectual, not elementary substance, and assuming what forms they please, while the four other classes are corporeal. In the enumeration, however, of these classes the *Purāṇas* differ. The Pitṛis reside in a world of their own, called Pitṛi-loka, which is sometimes supposed to be the moon; according to the *Purāṇas*, it is below the paradise of Indra, and is also the abode of the souls of devout Brahmans. The time at which the Pitṛis are to be worshipped, the libations which they are to receive, the benefit which they derive from them, and the boons which they confer on the worshipper, are all minutely described in the *Purāṇas*. See *S'RĀDDHA*. A song of the Pitṛis, as given by the *Viṣṇu-Purāṇa*, may convey an idea of the importance attributed to this worship, and of the manner in which the Brahmans turned it to their profit. It runs as follows: 'That enlightened individual who begrudges not his wealth, but presents us with cakes, shall be born in a distinguished family. Prosperous and affluent shall that man ever be who, in honour of us, gives to the Brahmans, if he is wealthy, jewels, clothes, lands, conveyances, wealth, or any valuable presents; or who, with faith and humility, entertains them with food, according to his means, at proper seasons. If he cannot afford to give them dressed food, he must, in proportion to his ability, present them with unboiled grain, or such gifts, however trifling, as he can bestow. Should he be utterly unable even to do this, he must give to some eminent Brahman, bowing at the same time before him, sesamum seeds, adhering to the tips of his fingers, and sprinkle water to us, from the palms of his hands, upon the ground; or he must gather, as he may, fodder for a day, and give it to a cow; by which he will, if firm in faith, yield us satisfaction. If nothing of this kind is practicable, he must go to a forest, and lift up his arms to the sun and other regents of the spheres, and say aloud: "I have no money, nor property, nor grain, nor any thing whatever fit for an ancestral offering; bowing therefore to my ancestors, I hope the progenitors will be satisfied with these arms tossed up in the air in devotion." See Wilson's *Viṣṇu-Purāṇa*.

PITT, WILLIAM, the second son of the Earl of Chatham and of Lady Hester Grenville, daughter of the Countess Temple, was born on the 28th May 1759. His genius and ambition displayed themselves with an almost unexampled precocity. 'The fineness of William's mind,' his mother writes of him, when he was but twelve years old, 'makes him enjoy with the greatest pleasure what would be above the reach of any other creature of his small age.' Owing to the excessive delicacy of his constitution, it was found impossible to educate him at a public school. His studies were, however, prosecuted at home with vigour and success. In 1773, he was sent to the university of Cambridge, where his knowledge of the classics seems to have

astonished veteran critics. To modern literature he appears to have been utterly indifferent—he knew no continental language except French, and that very imperfectly. Among English poets, he liked Milton best; the debate in *Pandemonium* being his favourite passage. In 1780, P. was called to the bar. He took chambers in Lincoln's Inn, and joined the western circuit. A general election having taken place in the autumn of the same year, he stood for the university of Cambridge; but he was at the bottom of the poll. Through the influence, however, of the Duke of Rutland, he obtained a seat in parliament as member for Appleby. Lord North was now prime minister. The Opposition consisted of two parties; one being led by Rockingham and Fox, the other by Lord Shelburne. The latter consisted chiefly of the old followers of Chatham; and to this party Pitt naturally became attached. On 26th February 1781, he made his first speech in parliament. It was in favour of Burke's plan of economical reform, and was a splendid success. 'It is not a chip of the old block,' said Burke; 'it is the old block himself.' Shortly before the meeting of parliament, in the autumn of 1781, the news arrived of the surrender of Cornwallis and his army. In the debate on this address, P. spoke with even more energy and brilliancy than on any former occasion. No one was so loud in eulogy as Henry Dundas, Lord Advocate for Scotland; and from this night dates a connection between him and P., which was only broken by death. After several defeats, the ministry resigned, and Rockingham was called on to construct a cabinet. P. was offered the vice-treasuryship of Ireland; but he declined to accept a position which did not confer a seat in the cabinet. On 7th May 1782, he made his first motion for a reform in the representation of the people; which motion was carried by only 20 votes in a house of more than 300 members. The reformers never again had so good a division till 1831. At the end of three months after his accession to office, Rockingham died; Lord Shelburne succeeded to the head of the treasury; and P., at the age of 23, became Chancellor of the Exchequer. In opposition to the government there was then formed a coalition emphatically known as 'The Coalition.' On Lord Shelburne's resignation in 1783, the king himself, who hated the Coalition, tried to persuade P. to take the helm of affairs; but he resolutely declined. The Duke of Portland succeeded, with Fox and North as Secretaries of State. P., from the Opposition benches, brought a second time the question of parliamentary reform before the House. His motion was lost by 293 votes to 149. On the prorogation, he visited the continent for the first and last time. In 1783, the ministry having been defeated on a motion for transferring the government of India to parliament, P. became First Lord of the Treasury and Chancellor of the Exchequer. But parliament was dead against him between 17th December 1783 and 8th March 1784; he was beaten in sixteen divisions. The nation, however, was in his favour; both on account of his policy, and from admiration of his private character. Pecuniary disinterestedness is what all can comprehend; and even when known to be overwhelmed with debt, when millions were passing through his hands, when the greatest men in the land were soliciting him for honours, no one ever dared to accuse him of touching unlawful gain. At the general election in 1784, 160 supporters of the Coalition lost their seats, P. himself heading the poll for the university of Cambridge. He was then, at 25 years old, the most powerful subject that England had seen for many generations. He ruled absolutely over the cabinet, and was at once the

Fort Duquesne, in an expedition against which, the British general, Braddock, was defeated in 1755, by an allied force of French and Indians. It was taken, on a third attempt, by General Forbes in 1758. The city was chartered in 1816; in 1845, it was nearly destroyed by fire. The population in 1840 was 21,115; in 1860, 49,220; or, including the towns which cluster around it, 115,000.

PITTSFIELD, a village in Massachusetts, U.S. of America, on the Western Railway, 151 miles west of Boston, and the terminus of the Housatonic and Pittsfield Railway. It has two cotton and nine woollen factories, various manufactories, the Berkshire Medical College, two banks, nine churches, &c. Pop. (1860) 8045.

PITUITARY BODY, a small reddish-gray mass of an oval form, weighing from six to ten grains, and situated on the sella turcica of the sphenoid bone, on the floor of the cavity of the skull. It is very vascular, and in its structure it resembles the ductless glands. In the foetus, it is relatively larger than in the adult, and contains a cavity which subsequently disappears. It derives its name from its having been formerly supposed to secrete the fluid which (as we now know) is yielded by the Schneiderian or pituitary membrane of the nostrils. Its function is not known.

PITYRIASIS (from the Greek word *pityron*, bran) is the term given to one of the squamous or scaly diseases of the skin, in which there is a continual throwing off of bran-like scales of epidermis, which are renewed as fast as they are lost. It may occur upon any part of the body, giving rise to brown patches, in which there are sensations of itching, tingling, or pricking. It is more easily cured than the other scaly diseases, and its removal can generally be effected by the frequent use of the warm bath; or, if it fails, recourse may be had to alkaline or sulphur baths; due attention being at the same time paid to the general health. It sometimes occurs on the scalp, when it is known as *dandruff*, and must be treated with weak alkaline lotions, or, if these fail, with tar ointment, provided there is no inflammation. There is a variety known as *Pityriasis versicolor*, which is probably due to the presence of a parasitic fungus, the *Microsporon furfurans*; but whether the fungus is the positive cause of the disease, or only an attendant on it, finding a suitable nidus in the diseased epidermis, is not certain. This variety may be detected by a microscopic examination of the exfoliated scales, when the spores and filaments of the fungus will be detected. The treatment of this affection must be solely local. Dr Watson mentions a case which yielded at once to a couple of sulphur baths. Probably the best remedy is the application of a saturated watery solution of sulphurous acid gas, or of one of the sulphites dissolved in diluted vinegar.

PIÙ (in Ital. more), as a musical term, when prefixed to another word, intensifies its meaning—e. g., *più mosso*, with more movement.

PIUS, the name of nine among the Roman pontiffs, of whom the following only appear to call for particular notice.—**PIUS II.**, originally known as *Æneas Sylvius*, was a member of the noble family of Piccolomini, and was born (1405) at Corsignano, in the duchy of Siena. His early life was not free from serious irregularities, but he made amends by his subsequent decorous conduct; and his eminent abilities as a canonist led to his being employed, when but 26 years of age, as secretary of the Cardinal of Fermo, in a post of the highest confidence at the council of Basel (q. v.). He was intrusted by that council—the views of which, in its conflict with the pope, he fully shared—

in several commissions of great importance; and on the election of the antipope, Felix V., *Æneas Sylvius* was chosen as his secretary. But having been sent by him as ambassador to the Emperor Frederick III., he was induced to accept office in the imperial court, and served on several embassies and other missions of importance on behalf of the emperor. In the difficulties between Frederick and the Pope Eugenius IV., which arose after the council of Florence, *Æneas* conducted so skilfully a negotiation with which he was intrusted, that the pope was induced to retain him in his own court, in the capacity of secretary. His views of church matters having undergone a considerable change, he continued in equal favour under the successor of Eugenius, Nicholas V., 1447; and under Callistus III., he was elevated to the cardinalate. On the death of Callistus in 1458, he was elected pope, and took the name of Pius II. His pontificate was embarrassed by some contests on German affairs, but it is chiefly rendered memorable by the sustained efforts which P.—the first in this policy of a long line of pontiffs, to whom the public security of Europe owes a deep obligation—made to organise an armed confederation of Christian princes to resist the progress of the Turkish arms. This organisation, however, for a long time did not lead to any considerable results. P. died, August 14, 1464. The literary reputation of the scholar, *Æneas Sylvius*, has partially eclipsed the historical fame of the Pope Pius. He was one of the most eminent scholars of his age. His works were published at Basel (1 vol. fol., 1551), but many of his works are not included in that edition. They consist chiefly of histories, or historical dissertations and materials of history; but the most interesting portion of his collected works are his letters, which are very numerous, and full of details, characteristic as well of the writer as of the age. The same may be said of a biographical commentary, which is in truth an autobiography, being chiefly written from his own dictation, by his secretary, John Gobelius, published at Frankfurt in 1614. See Voight's *Life of Pius* (Berl. 1856).—**PIUS IV.**, Giovanni Angelo Medici, uncle of Saint Carlo Borromeo, deserves to be noticed from his connection with the celebrated creed known under his name. He was elected in 1560; and his pontificate is chiefly memorable as that in which the protracted deliberations of the Council of Trent (q. v.) were brought to a close. P. had the duty, in December 1563, of issuing the bull confirmatory of its decrees. The well-known creed called the Creed of Pius IV., and sometimes the Tridentine Creed, was issued by P. IV. as an embodiment of all the doctrines defined in that council. P. died, December 8, 1565, in the arms of his nephew, Carlo Borromeo.—**PIUS V.**, a saint of the Roman Catholic Church, originally named Michele Ghisleri, was born of poor parents, in the village of Bosco, near Alessandria, in 1504, and at the age of fourteen, entered the Dominican order. His eminent merits were recognised by Paul IV., who named him Bishop of Satina in 1556, and cardinal in the following year. Of austere and mortified habits, he carried into his administration the same rigour which distinguished his personal conduct; and when appointed inquisitor-general for Lombardy, he employed the most rigorous measures in repressing the progress of the Reformation, which had begun to effect an entrance. He was afterwards translated to the see of Mondovì; and immediately after the death of Pius IV., he was chosen unanimously as his successor, January 8, 1566. P. carried into his pontifical life the same personal austerity and administrative rigour which he had evinced as a bishop. Applying to others the same

Fontainebleau, he was treated with much external respect; and on Napoleon's return from the Russian campaign, in December 1812, orders were given that the cardinals, with certain exceptions, should be admitted to the presence of the pope. Under much pressure, both from the emperor himself—who is alleged by some to have acted with great rudeness, and even with personal violence—and from the ecclesiastics to whom the emperor confided his plans, P. was induced to sign a new concordat, an important provision of which was the recognition of the annexation of the Roman states to the empire. Having obtained the concession, Napoleon at once permitted the absent cardinals to return, and of these many remonstrated so earnestly against the concordat, that, on March 24, P. wrote to revoke his consent. Napoleon took no notice of the revocation; nor was it till after the disasters of 1813 that he began to seek an accommodation. P. refused to treat until he should be restored to Rome; and on January 22, 1814, orders were sent for his immediate return to his capital. Unattended by his cardinals, he was escorted to Italy, and remained at Cesena until the fatal campaign of the spring of 1814 placed Paris in the hands of the allies, when P. re-entered Rome amidst the gratulations of the people on May 24, 1814—a day since that time held sacred in the Roman calendar. During the Hundred Days, he was again compelled to leave Rome; but after the campaign of Waterloo, he finally resumed possession, which was undisturbed for the rest of his life, and which extended to the whole of the ancient territory, including the Legations.

The last years of his pontificate were devoted to measures of internal administration; and under the enlightened government of Cardinal Consalvi, were marked by much wisdom and moderation. But the administration chiefly by ecclesiastics and the secrecy of law procedure were resumed. P. repressed, too, with great vigour the disorder and brigandage which the long wars had introduced, and a whole village of notorious and incorrigible criminality, that of Somma, was razed to the ground in 1819. He was equally vigorous in repressing secret societies, especially that of the Carbonari (q. v.). The ecclesiastical measures of his later period were also of much importance. In 1814, he formally restored the suppressed order of the Jesuits (q. v.). In 1817 and the following years, he concluded concordats with Naples, with Prussia, Würtemberg, and other courts of Germany. In this and every other period of his life, P. was a model of gentleness, simplicity, benevolence, and Christian charity. In July 1823, having reached the patriarchal age of 81, he fell accidentally in his own apartments, and broke his thigh. Under the inflammation which ensued, he sunk gradually, and died August 20, 1823.

PIUS IX., GIOVANNI MARIA MASTAI FERRETTI, the reigning pontiff, was born at Sinigaglia, May 13, 1792. He was originally destined for the military profession, and was sent to Rome to enter the Noble Guard; but symptoms of an epileptic tendency led to his abandoning his intended profession, and entering an ecclesiastical seminary. He received holy orders, and for a time exercised his ministry in connection with several works of charity and benevolence in Rome; but was sent to South America as 'auditor' of Monsignor Mugé, the vicar-apostolic of Chili. On his return, he became domestic prelate of Leo XII., and President of the Ospizio di San Michele; and in 1829 he was named Archbishop of Spoleto, whence he was translated to Imola. He was soon afterwards sent to Naples as nuncio; and in 1840, was named cardinal, from which date

he continued to reside in his see. On the death of Gregory XVI. in 1846, Cardinal Mastai Ferretti was elected by acclamation to succeed him; and having learned, by long intercourse with the people of the Legations, the prevalence and the causes of discontent—which had been concealed under the repressive system of Gregory, following the direction of the Austrians, by whom a protectorate was exercised—he entered at once on a course of reforms, by which he hoped to establish the papal government on a popular, but yet on a firm basis. He resolved to extirpate all abuses of administration, financial as well as political, to withdraw as far as possible the restrictions of personal liberty, to secularise in many details the local administration, and to extend the rights of self-government as far as was compatible with the essential institutions of the Roman states. His first step to this end was to grant an amnesty; and this measure, however humane and necessary, had the unfortunate result of drawing together into the Roman states a body of men whom an unhappy experience of foreign exile had embittered against the existing order of things, and who had served in foreign revolutions, and, in the secret councils which their position had necessitated, an apprenticeship to the arts of political intrigue. For a time, the reforming policy of P. carried with it the affections of the people; but he soon began to fall short of the expectations which he had created. The outbreak of the revolution of February 1848 precipitated the crisis of popular excitement and of popular discontent. Reform assumed the shape of revolution. In November of that year, Count Rossi, whom the pope had appointed as his minister, was assassinated; and violent demonstrations were daily employed to compel the pope's assent to measures which he repudiated. He was driven to confine himself a close prisoner in the Quirinal; and at length, in December, he fled secretly from Rome and established himself at Gaeta, a Neapolitan seaport, not far beyond the Roman frontier. A republic was proclaimed in Rome, the provisional heads of which proceeded to a complete and radical remodelling of the civil government of the state. P. from his exile addressed a remonstrance to the various sovereigns. In April 1849, a French expedition was sent to Civita Vecchia, which eventually advanced upon Rome, and after a siege of about 30 days took possession of that city, and established a French army of occupation within the Roman state. The pope's government was re-established, but he himself did not return till 1850, when, once again, he entered upon the administration. In consequence of the unsettled condition of Italy and the failure of many of his early measures of improvement, he declared himself unable to proceed with the reformations which he had contemplated. Since that time, his authority has been maintained without interruption; but it has always been believed that the discontent with the government still continues, and that, if the French army were withdrawn, violent changes would be imminent. In consequence of the war for the unification of Italy, the Legations, Ancona, and a considerable part of the papal territory southward in the direction of Rome, have been annexed to the kingdom of Italy, but P. has persistently refused to cede any portion or to enter into any compromise. His ecclesiastical administration has been very active, and has proceeded upon the strongest assumption of the right of independent action on the part of the church. In this view, he re-established the hierarchy in England, he sanctioned the establishment in Ireland of a Catholic university, and condemned the principles upon which the Queen's Colleges in that country were

no vessel floated, and it ran amid gloomy woods, the silence of which was undisturbed save by the sound of the rushing waters. Here P. caused a rude bark to be constructed for the transport of the baggage and of the weaker travellers. Francisco de Orellana was intrusted with the command of the vessel. P., hearing of a populous nation at the distance of a few days' journey, who dwelt near the confluence of the Napo with a larger river, sent forward Orellana to obtain and bring back supplies for the starving travellers, who had eaten the last of their horses, and were now reduced to the leather of their saddles and belts. Orellana reached the Amazon; but, unable either to obtain supplies, or to return against the current of the river, abandoned the expedition, and with his fifty followers resolved to sail down the Amazon, reach the Atlantic, and make for Spain. This wonderful design was successfully carried out. P., after waiting in vain for the return of the barque, resolved to return to Quito, which, after enduring terrible sufferings, and seeking fruitlessly for the rich regions of which he had heard so much, he reached in June 1542, after an absence of more than two years. The fatal character of this expedition may be inferred from the appearance the travellers presented on their return. Half of the 400 Indians had perished, and of the Spaniards, only eighty remained; and these, clad in skins, blackened by the sun, and wasted by hunger and fatigue, with long matted locks, seemed like a troop of spectral savages. This expedition stands unmatched in the annals of American discovery for its dangers and sufferings, for the length of their duration, and for the heroic fortitude with which they were endured. For the fate of Gonzalo P., see article *PERU*.

PIZZICATO (Ital. twitched), abbreviated *pizz.*, a phrase used in Music for the violin or violoncello, to denote that the strings, instead of being played as usual by the bow, are to be twitched with the fingers in the manner of a harp or guitar. The pizzicato is much used in accompaniments, as sounds thus produced do not cover the voice; it is also used in symphonic effects. The ordinary mode of playing is restored by the letters *c. a.* (*col arco*, with the bow).

PLACENTA, or **AFTER-BIRTH**, a temporary organ that is developed within the uterus during pregnancy, and is, as its popular name implies, expelled from the maternal organism shortly after the birth of the child or young animal. It is a spongy vascular mass, existing in some form or other in all mammals, excepting the *Marsupialia* and *Monotremata*, as an appendage to the fetal membrane called the *chorion*. In the human subject (fig. 1), it is of considerable size at the period of delivery, being of a rounded or oval form, with a diameter of 6 or 8 inches, and a thickness of somewhat more than an inch. Its outer surface, which, till the period of its detachment and expulsion, is attached to the walls of the uterus, is uniform and level (unless it has been morbidly adherent), being covered by a membrane, shortly to be noticed, called the *decidua serotina*; and on peeling off this membrane, the various lobes of which the placenta is composed are apparent. The internal or free surface is smooth and shining, and gives attachment to the umbilical cord or navel-string, which connects it with the fetus. To render the mode of formation of the placenta clear, we must premise that the impregnated ovum, when it reaches the uterus, is invested with an outer membrane, the *chorion*, which forms a shut sac, externally covered with short villi. As the ovum advances in age, these villi diminish in number, until few remain,

except at that part of the chorion which is in contact with the uterus; and here, about the second month (in the human subject), they divide into branches, as shewn in fig. 2. While these changes are going on in the membrane of the ovum, the uterus is also undergoing modification; and it is on the nature and extent of these uterine changes that the character or type of the placenta depends.

Fig. 1.—Human Placenta (half of it being split in two) and Umbilical Cord.

There are two such types, the first of which is best represented by the human placenta, and the latter by that of the pig.

In animals exhibiting the first type of placental structure, the mucous membrane lining the uterus

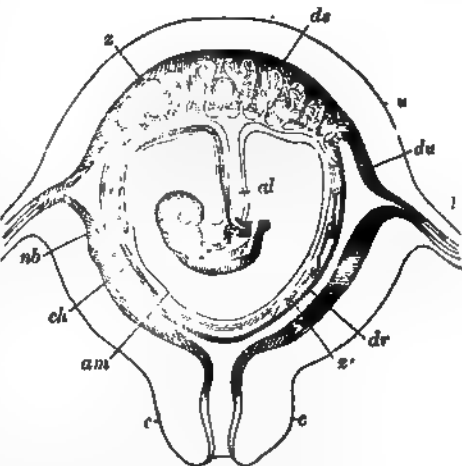


Fig. 2.—Diagrammatic Section of a Human Pregnant Uterus, with the contained Ovum:

u, uterus; f, oviuct (or Fallopian tube); c, cervix uteri (or neck of the womb); ds, decidua uteri; dr, decidua serotina; ch, chorion; am, amnion; al, allantois; nb, umbilical vesicle; z, villi, which form the fetal part of the placenta; z', villi over the rest of the chorion, which, in the human subject, take no part in the placental function.

undergoes a rapid growth and modification of texture, becoming connected with the *membrana decidua*, which is so called from its being thrown off at each parturition. For brevity, it is usually termed the *decidua*. This decidua is from an early period separable into three portions—the *decidua*

in almost all true *Ruminants*, the foetal villi are gathered into bundles or cotyledons (fig. 3), which in the sheep are convex, and are received into cups

be correct as to different orders of plants. It is certain that in many cases in which the placenta appear as axile, they are formed from the sides of the carpellary leaves which fold in to meet in the axis, and form *Dissepiments* (q. v.) between the cells of the germen. The number of placentas corresponds with the number of carpels in the germen, or appears to be the double of it, each carpel producing two rows of ovules instead of one. See figures in article *PISTIL*.

PLACENZA. See *PIACENZA*.

PLACETUM REGIUM, called also

PLACET, EXEQUATUR, LETTRES PATENTES, is an act or instrument executed in virtue of the privilege claimed by the government in certain kingdoms to exercise a supervision over the communications of the Roman pontiff with the clergy and people of those kingdoms, and to suspend or prevent the publication of any brief, bull, or other papal instrument which may appear to contravene the laws of the kingdom, or to compromise the public interest. The early Christian emperors, it is well known, freely stretched their legislation into the affairs of the church, and one constant cause of conflict between church and state, in the medieval period, was the attempt, on the part of the sovereigns, to control the free intercourse of the pope with the several churches. In the Pragmatic Sanction in France, and in the similar legislation of Spain, Portugal, Sicily, and the Low

Countries during the 15th c., the claims of the state on the same head are more than once asserted, and among the so-called 'liberties' of the later Gallican Church was a certain, though not a complete subjection to the state in this particular; but it was in the German states that this claim was most distinctly asserted, and most formally embodied in the constitutional law. The principle upon which the Peace of Westphalia, so far as regards its religious provisions, is based, is that the will of the sovereign of the state is supreme and final in all the concerns of religion. *Cujus regio illius et religio* ('Whose territory, his also the religion'), became the maxim of church government; and, of course, within certain limits, the Catholic sovereigns acted as freely upon it as the Protestant. This intermixture of the spiritual and the temporal prevailed especially in the mixed governments of the ecclesiastical sovereigns of Germany, the prince-bishops of the Rhine; but without the same foundation, the system was carried to its height in Austria under Joseph II. (see *FEBRONIANISM*, *PIUS VI.*), the excessive maintenance of whose ecclesiastical ordinances procured for him the sobriquet of 'The Sacristan.' Under him, all pontifical bulls, briefs, and constitutions, and all the ordinances of the local bishops, were made subject to the imperial censorship, and it was forbidden to publish any of them without its receiving the *placet* of the emperor. The only exception, in the case of pontifical decrees, regarded those emanating from the Roman Penitentiary (q. v.), which, as being of their nature secret, were not held subject to revision. In Prussia, the same law was enforced, as also in Baden and Saxony, no less than in the Protestant governments of Würtemberg, Saxe-Gotha, Saxe-Weimar, &c. These claims of the state had always been the subject of protest on the part of the Roman see, but the church, nevertheless, had been compelled to acquiesce silently in the enforcement. In many cases, however, they have led to serious disputes, of which the mixed-marriage question in Prussia furnished a recent and very

Fig. 3.—Uterus of a Cow in the middle of Pregnancy, laid open:

v, vagina; u, uterus; ch, chorion; c', uterine cotyledons; c'', foetal cotyledons.

of the mucous membrane of the uterus; while in the cow, on the contrary, they are concave, and fit upon corresponding convexities of the uterus.

The remarks which have been made on the functions of the human placenta, are equally applicable to all placental mammals generally.

The *diseases* of the human placenta had not been studied with any accuracy, until the subject was taken up by Professor Simpson. This distinguished physician and subsequent observers have ascertained that the placenta is liable to (1) congestion, ending in the effusion of blood into the substance of the organ upon its surfaces, or between the membranes; (2) Inflammation, giving rise to adhesions, or terminating in suppuration, which may occasion very serious constitutional disturbances; (3) Partial or entire hypertrophy or atrophy; and (4), Fatty degeneration, affecting its small vessels. Whatever be the form of disease by which the placenta is attacked, the result is usually fatal to the foetus.

PLACENTA, in Botany, a membrane of the interior of the Germen (q. v.) or ovary, to which the ovules are attached either immediately or by Umbilical Cords (q. v.). The placenta sometimes appears as a mere thickening of the walls of the germen. In many cases, it is a more decided projection from the walls of the germen. When thus connected with the walls of the germen, the placenta is described as *parietal* (Lat. *paries*, a wall). But in some plants, the placentas of the different cells of the germen are united together in a column in its axis, and they are then described as *axile*. This distinction is of great importance as characterising different natural orders. Parietal placentas are formed where the edges of carpellary leaves unite; but great difficulty has been experienced by vegetable physiologists in explaining the formation of axile placentas; some regarding them as also originally formed in this manner, and others as formed in a quite different manner from the axis itself; nor is it impossible that both theories may

great plague of London in 1665, the deaths from the plague were, in June, 590; in July, 4129; in August, 20,046; in September, 26,230; in October, 14,373; in November, 3449; while in December, they were less than 1000.

The exact nature of the disease is unknown. A poison whose characters evade all chemical and microscopical examination, is absorbed, and alters at once, or after a short stage of incubation, the composition of the blood and the condition of the tissues.

With respect to treatment, little can be done to arrest the progress of the disease in any individual case. The patient should, if possible, be removed at once from the source of the disease; he should be exposed freely to fresh air; his secretions should be duly regulated, and his strength supported as far as possible. Friction with olive oil has been strongly recommended, but subsequent experience has not confirmed the first reports in its favour. But although treatment is comparatively valueless, much may be done towards guarding against the attacks of the disease. There can be little doubt that it is in consequence of the free external use of cold water, perfect cleanliness, moderate habits of life, and superior ventilation, that European (especially English) residents in the infected cities of the Levant are comparatively exempt from this disease. It is very possible that inunction of the body with olive oil may be (as has been asserted) a useful prophylactic agent, although it fails to cure the disease. It is almost needless to add, that all unnecessary communication with the sick, or contact with clothes or other matter that may have been infected with the poison, should be as much as possible avoided.

PLAICE (*Platessa vulgaris*), a species of Flounder (q. v.), much resembling the common flounder, but rather broader in proportion to its length; the upper surface of the body and the fins olive-brown, marked with large bright orange spots; a row of similar spots on the dorsal fin and on the anal fin; no tubercular asperities on any part of the body, but a curved row of bony tubercles on the eye-side of the head. The P. inhabits sandy and muddy banks, not in very deep water, and is very abundant on most parts of the British coasts, as well as on those of continental Europe. Like the common flounder, it often ascends slow rivers to some distance from the sea, and it has even been found to thrive well when transferred to fresh-water ponds. It feeds on worms, molluscs, small crustaceans, and young fishes. It has been known to attain the weight of fifteen pounds, but a P. of seven or eight pounds is accounted large. It is taken both by lines and trawl-nets. It is in considerable esteem for the table, although so plentiful in the British markets, that it is in general very cheap.

PLAID, a woollen garment, in the form of a large scarf, to wrap round the body, and used chiefly among the rural population of Scotland. See **TARTAN**.

PLAIN, in Geography, is an extensive tract of country which, on the whole, preserves a nearly uniform elevation. When referred to the level of the sea, plains may be distinguished into low plains or lowlands, and elevated plains called plateaux or *Table-lands* (q. v.). Plains differ much in appearance, according to the nature of their soil and climate, from the frightful sandy wastes of Africa, to the luxuriant fertility of the South American *silvas*. They are occasionally crossed by hills of moderate altitude, which, however, are generally detached, and exhibit no connection with

any neighbouring mountain system. These hills often, as in the North American plains, degenerate into mere undulations, perfectly uniform in structure. The term 'plains' is, in a limited sense, confined to the plains of Western Europe; those of other parts of the world receiving special designations, and differing from each other in many important points; thus, we have the *Steppes* (q. v.) of Eastern Europe and Asia; the *Deserts* (q. v.) of Arabia and Africa; the *Savannahs* (q. v.) and *Prairies* (q. v.) of North America; and the *Llanos* (q. v.), *Pampas* (q. v.), and *Silvas* (q. v.) of South America. The chief plains of Europe are, the country stretching from the foot of the Carpathians in Galicia to the Ural Mountains (including Poland and Russia), the drainage-area of the Danube in Hungary, and the portion of Europe which is bounded by the Elbe, the Harz Mountains, France, and the sea. Plains of comparatively small extent, but presenting the necessary characteristics in perfection, are found in almost all countries.

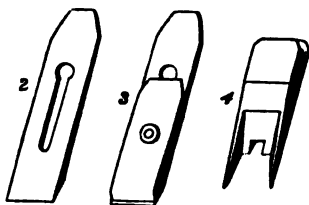
PLAINSONG, or **CANTO FERMO** (Ital.), a name given by the Church of Rome to the ecclesiastical chant. It is an extremely simple melody, admitting only notes of equal value, rarely extending beyond the compass of an octave, and never exceeding nine notes, the staff on which the notes are placed consisting of only four lines. The clefs are C and F. St Ambrose is considered to have been the inventor or systematiser of Plainsong. His labours consisted in selecting from the extremely complicated system of the Greeks a set of scales sufficiently few and simple for a very rude people. During the two centuries succeeding the death of Ambrose, his institutions fell into utter confusion. Gregory the Great revived and perfected them, recasting them into an *Antiphony*, or authorised body of ecclesiastical music, and brought Plainsong into the state in which it is yet used in the Roman church. See **AMBROSIAN CHANT** and **GREGORIAN CHANT**.

PLAINTIFF, in English and Irish Law, is the name given to the person who institutes and maintains a civil action or suit against another, who is called the Defendant. In Scotland, a plaintiff is called a Pursuer. But in both countries, many proceedings and applications of a civil nature are commenced by petition; and hence the party taking the initiative is called the Petitioner.

PLAN, a word frequently applied to all kinds of architectural drawings, but which ought to be limited to those which represent the horizontal sections of the various floors of buildings. Plans shew the disposition of the apartments and walls, with the situation of the fireplaces, cupboards, doors, &c.; they, in fact, represent the different stories as they actually appear as seen from above, when the walls are built two or three feet above the level of each floor.

PLANARIA, a genus of worms placed by Cuvier among *Entozoa*, although not parasites, but inhabitants of stagnant waters, because of their great resemblance to some of the entozoic parasites, and particularly to flukes. The species are numerous. Some inhabit fresh, and others salt water; they feed on small annelids, molluscs, &c. They are generally found creeping among confervæ, or on the stems of plants. Many of the larger marine species are able to swim freely by flappings of the broad margins of their bodies. The body of a planaria seems to be entirely gelatinous; but M. de Quatrefages has detected under the skin an arrangement of muscular fibres. Two red specks in the fore-part of the body of many species have been supposed to be eyes; but there is no proof of

sharp chisel-edge of the cutting-tool projects through the slit in the bottom of the body of the plane, so that when the tool is pushed forward by the force of the hand, the cutting edge pares off all irregularities, until the wood is as smooth as the under



surface of the plane. There are many modifications in this tool, which can have its cutting edge and under surface made to almost any contour, so that mouldings of all kinds may be made. The two commonest are the jack-plane for rough work, and the smoothing-plane for finishing off plane surfaces.

PLANING-MACHINES have lately been much in use, by which both wood and metal are planed. In the case of those intended for wood, the cutting instruments are moved forward over the wood by machinery in the same manner as in the hand-plane. The precision and rapidity with which these machines work have given great facilities for building, as one machine will do as much work as sixty men. The planing-machines used for metal are different in principle. A well-tempered, chisel-edged steel cutter is held in a fixed position, pressing downwards upon the metal plate, which is moved forward by powerful machinery. The action of this movement is, that a groove is ploughed into the metal of the size of the steel cutter; when the metal has travelled its full length, and has made the groove complete, the downward pressure of the tool is removed, and by the action of the double screw which has carried it forward, it is returned, and readjusted for another groove to be formed by the side of the first; and this is repeated until the whole surface of the plate is reduced to the required level. However tedious this process may appear, it offers such facilities for metal working as were previously unknown.

PLANETA, the Greek name of the vestment called by the Latins *Casula*, and in English 'Chasuble,' which is worn by priests in the celebration of mass. The form of this vestment in the modern Roman church, differs both from the ancient form and from that in use in the Greek church. The change appears to date from the 9th c., but has been gradual. A certain modification of the Roman planeta was recently introduced in England under the inspiration of the late Mr Pugin, the great reviver of Gothic architecture and ecclesiastical costume and decoration. But its use has been only partial even in England.

PLANETARIUM, a machine much employed by astronomers in the 17th and 18th centuries, and first constructed by Huyghens and Römer, for the purpose of exhibiting clearly the motion of the heavenly bodies in conformity with the Copernican doctrine. The P. exhibited only the orbital motions of the planets about the sun, either in circles or ellipses, and with constant or varying motions, according to the perfection of the machine. It was subsequently supplemented by the combined *tellurian* and *lunarian*, which exhibited at one and the same time the motion of the moon about the earth and that of the latter round the sun, with the principal phenomena (such as the succession of day and night, the varying length of each, eclipses, and

the motion of the moon's apogee and nodes) which accompany these motions. A *satellite machine* was also invented to illustrate the motions of Jupiter's satellites. All these machines are now combined in the Orrery (q. v.), which exhibits in the best manner possible the varied motions and phenomena of the bodies in the solar system.

PLANETOIDS, or ASTEROIDS, the name given to that numerous group of very small planets which are situated in the solar system between Mars and Jupiter. Till the present century they remained undiscovered; but for some years before, their existence had been suspected, mainly owing to the remarkable hiatus in the series of the planetary distances when compared with the law of Bode (q. v.). On the first day of the present century the first of them was detected by Piazzi of Palermo, and his success roused his brother astronomers to search for more planets. Their search was successful, for Olbers (q. v.) discovered two in 1802 and 1807, and Harding one in 1804; but as all researches for some time subsequent to 1807 were unavailing, astronomers gradually allowed themselves to settle down into the belief that no more planetoids remained to be discovered, when the detection of a fifth by Hencke in 1845, revived the hope of fresh discoveries, and from this period no year (excepting 1846) has passed without adding to the list. The number at present (1864) known is 81. This remarkable success of the astronomers of our time is due to the systematic manner in which the zodiacal belt has been explored, and the place and apparent size of every star of this region distinctly determined; so that the presence of a wandering body can at once be detected.

The magnitudes of these celestial bodies have not been accurately ascertained, but it is certain that they are exceedingly small as compared even with Mercury, the least of the other planets; the diameter of the largest among them being generally believed not to exceed 450 miles, while most of the others are very much smaller than this. They also differ, generally speaking, from the rest of the planets in other respects; their orbits are of greater eccentricity, are inclined to the ecliptic at a greater angle, and are interlaced in a most intricate manner, crossing each other so frequently as to form, when viewed perpendicularly, a kind of network. The consequence of this is, that a planetoid which is nearest the sun at one part of its orbit, is, when at another part of its orbit, further from it than are several of the others, and a mutual eclipsing of the sun at different periods by two planetoids must be of very frequent occurrence. From the generally large size of their angle of inclination to the ecliptic, many of them occasionally travel far beyond the limits of the zodiac, and are thence termed *ultra-zodiacal planets*. Of the planetoids, Flora has the shortest period of revolution (1193 days), and consequently, by Kepler's third law, its mean distance from the sun is a little over 209 millions of miles; Maximiliana has the longest period (2343 days), and its mean distance from the sun is about 330 millions of miles. Concordia's orbit has least eccentricity, that element amounting to little more than $\frac{1}{4}$ of the major axis, while in Polyhymnia it amounts to more than $\frac{1}{2}$. Massalia's orbit makes a smaller angle—only $41^{\circ} 7'$ —with the ecliptic than that of any other planet in the solar system, while the inclination of the orbit of Pallas is no less than $34^{\circ} 42' 41''$. After the first two or three of these bodies had been discovered, the opinion was propounded by Olbers that they were but the fragments of some large planet; and this hypothesis received corroboration from the intimate connection which was shewn

PLANETIODS—PLANETS.

to subside among them; but of late years it has, to a considerable extent, fallen out of favour with astronomers.

The 81 planetoids, with the names of their discoverers, the dates of their discovery, and their periods of revolution, are as follows:

Name.	Date of Discovery.	Discoverer.	Period of Sidereal Revolution in Days.
1. Ceres,	1801, January 1, .	Piazzi, Palermo,	1681.
2. Pallas,	1802, March 28, .	Obers, Bremen,	1684.
3. Juno,	1804, September 1, .	Harding, Lillenthal (Bremen),	1582.
4. Vesta,	1807, March 29, .	Obers, Bremen,	1326.
5. Astraea,	1847, December 8, .	Hencke, Drisen (Prussia),	1511.
6. Hebe,	1847, July 1, . . .	Hencke, Drisen (Prussia),	1380.
7. Iris,	1847, August 13, .	Hind, London,	1346.
8. Flora,	1847, October 18, .	Hind, London,	1193.
9. Metis,	1848, April 25, . . .	Graham, Sligo,	1347.
10. Hygiea,	1849, April 12, . . .	De Gasparis, Naples,	2043.
11. Parthenope,	1850, May 11, . . .	De Gasparis, Naples,	1402.
12. Victoria,	1850, September 13, .	Hind, London,	1301.
13. Egeria,	1850, November 2, .	De Gasparis, Naples,	1611.
14. Irene,	1851, May 19, . . .	Hind, London,	1513.
15. Eunomia,	1851, July 29, . . .	De Gasparis, Naples,	1570.
16. Psyche,	1852, March 17, . . .	De Gasparis, Naples,	1826.
17. Thetis,	1852, April 17, . . .	Luther, Bilk (Dusseldorf),	1420.
18. Melpomene,	1852, June 24, . . .	Hind, London,	1270.
19. Fortuna,	1852, August 22, . . .	Hind, London,	1343.
20. Massalia,	1852, September 19, .	De Gasparis, Naples,	1366.
21. Lutetia,	1852, November 15, .	Goldschmidt, Paris,	1353.
22. Calliope,	1852, November 16, .	Hind, London,	1612.
23. Thalia,	1852, December 15, .	Hind, London,	156.
24. Themis,	1854, April 5, . . .	De Gasparis, Naples,	2034.
25. Ptoecia,	1853, April 7, . . .	Chacornac, Marseille,	1359.
26. Proserpine,	1853, May 5, . . .	Luther, Bilk,	1581.
27. Euterpe,	1853, November 8, .	Hind, London,	1314.
28. Bellona,	1854, March 1, . . .	Luther, Bilk,	1689.
29. Amphitrite,	1854, March 1, . . .	Marth, London,	1492.
30. Urania,	1854, July 22, . . .	Hind, London,	129.
31. Euphrosyne,	1854, September 1, .	Ferguson, Washington,	2048.
32. Penona,	1854, October 26, .	Goldschmidt, Paris,	150.
33. Polyimnia,	1854, October 28, .	Chacornac, Paris,	1778.
34. Circe,	1855, April 6, . . .	Chacornac, Paris,	1609.
35. Leucothea,	1855, April 19, . . .	Luther, Bilk,	1908.
36. Atalanta,	1855, October 5, . . .	Goldschmidt, Paris,	1666.
37. Fides,	1855, October 5, . . .	Luther, Bilk,	1564.
38. Leda,	1856, January 12, . .	Chacornac, Paris,	167.
39. Laetitia,	1856, February 8, . .	Chacornac, Paris,	1644.
40. Harmonia,	1856, March 31, . . .	Goldschmidt, Paris,	1247.
41. Daphne,	1856, May 22, . . .	Goldschmidt, Paris,	1779.
42. Isis,	1856, May 23, . . .	Pogson, Oxford,	1392.
43. Ariadne,	1857, April 13, . . .	Pogson, Oxford,	1195.
44. Nysa,	1857, May 27, . . .	Goldschmidt, Paris,	1379.
45. Eugenia,	1857, June 27, . . .	Goldschmidt, Paris,	160.
46. Hestia,	1857, August 16, . . .	Pogson, Oxford,	1470.
47. Melete,	1857, September 9, .	Goldschmidt (Paris), Schubert (St. Petersburg),	1529.
48. Axialia,	1857, September 15, .	Luther, Bilk,	1783.
49. Doris,	1857, September 19, .	Goldschmidt, Paris,	1998.
50. Pales,	1857, September 19, .	Goldschmidt, Paris,	1280.
51. Virginia,	1857, October 4, . . .	Ferguson, Washington,	1577.
52. Nemausa,	1858, January 22, . .	Laurent, Nimes (France),	1330.
53. Europa,	1858, February 6, . .	Goldschmidt, Paris,	1993.
54. Calypso,	1858, April 4, . . .	Luther, Bilk,	1543.
55. Alexandra,	1858, September 10, .	Goldschmidt, Paris,	1629.
56. Pandora,	1858, September 10, .	Searle, Albany, New York,	1674.
57. Mnemosyne,	1859, September 22, .	Luther, Bilk,	2019.
58. Concordia,	1860, March 24, . . .	Luther, Bilk,	1619.
59. Olympia,	1860, September 12, .	Chacornac, Paris,	163.
60. Echo,	1860, September 16, .	Ferguson, Washington,	1352.
61. Danaë,	1860, September 19, .	Goldschmidt, Paris,	1902.
62. Erato,	1860, September 14, .	Förster, Berlin,	2023.
63. Ausonia,	1861, February 10, . .	De Gasparis, Naples,	1356.
64. Angelina,	1861, March 4, . . .	Tempel, Marseille,	1601.
65. Maximiliana,	1861, March 8, . . .	Tempel, Marseille,	2143.
66. Maia,	1861, April 9, . . .	Tuttle, Cambridge, Massachusetts,	1568.
67. Asia,	1861, April 17, . . .	Pogson, Madras,	1375.
68. Heberia,	1861, April 29, . . .	Schiaparelli, Milan,	1893.
69. Letho,	1861, April 29, . . .	Luther, Bilk,	1638.
70. Panopea,	1861, May 5, . . .	Goldschmidt, Chatillon (Paris),	1557.
71. Nibbe,	1861, August 13, . . .	Luther, Bilk,	1671.
72. Feronia,	1862, February 12, . .	Peters (Clinton, N.Y.), & Safford (Washington),	1148.
73. Clytie,	1862, April 7, . . .	Tuttle, Cambridge, Massachusetts,	1590.
74. Galatea,	1862, August 29, . . .	Tempel, Marseille,	1509.
75. Kurydice,	1862, September 22, .	Peters, Clinton, N.Y.,	1590.
76. Freya,	1862, October 21, . .	D'Arrest, Copenhagen,	2080.
77. Fugga,	1862, November 12, .	Peters, Clinton, N.Y.,	1360.
78. Diana,	1863, March 15, . . .	Luther, Bilk,	Not determined.
79. Eurynome,	1863, September 19, .	Watson, Ann Arbor, America,	Not determined.
80. Sappho,	1864, May 3, . . .	Pogson, Madras,	Not determined.
81. Teleschore,	1864, September 30, .	Tempel, Marseille,	Not determined.

PLANETS (Gr. *planētēs*, 'a wanderer'), are the heavenly bodies (including the Earth) which belong to our solar system, and revolve in elliptic

orbits round the sun. They are often denominated *primary planets*, to distinguish them from their moons or satellites, which are called *secondary*

land; the green, water; while the white spots at the poles are with some reason supposed to be snow, since they decrease when most exposed to the sun, and increase under the contrary circumstances. The Phases (q. v.) of Mars range between full, half, full (in conjunction, if visible), and half.—After Mars in order come the *Planetoids* (q. v.), formerly but improperly called *Asteroids*.—*Jupiter*, the next in order, is the largest of all the planets, its bulk being more than 1400 times that of the Earth, though, from its small density, its mass is only 338 times more. After Venus it is the brightest of the planets and the largest in apparent size, its angular diameter varying from 30" to 45". When looked at through a telescope, it is seen to be considerably flattened at the poles, owing to its rapid revolution on its own axis; and its surface is crossed in a direction parallel to its equator by three or four distinct and strongly-marked belts, and a few others of a varying nature. Spots also appear and remain for some time on its surface, by means of which its revolution on its axis has been ascertained. This planet is attended by four satellites, which are easily observable through an ordinary telescope, and which have rendered immense service in the determination of longitudes at sea, and of the motion and velocity of light. The satellites, which were discovered by Galileo, were proved by Sir William Herschel to revolve on their own axes in the same time that they revolve round their primary. The smallest is about the same size as our Moon, the others are considerably larger.—*Saturn*, the next in position, is about 735 times larger in volume, though only about 100 times greater in mass than the earth. Its apparent diameter when in opposition is 15", and there is a considerable flattening towards the poles. Its surface is traversed by dusky belts much less distinctly marked than those of Jupiter, owing doubtless in great part to its inferior brightness; its general colour is a dull white or yellowish, but the shaded portions, when seen distinctly, are of a glaucous colour. The most remarkable peculiarity of Saturn is its ring, or series of concentric rings, each one parallel and in the same plane with the others, and with the planet's equator; the rings are at present supposed to be three in number, the two outermost are bright like the planet itself, while the innermost is of a purplish colour, and is only discernible through a powerful telescope. The rings are not always visible when Saturn is in the 'opposite' half of its orbit, for when the plane of the rings is intermediate between that of the earth's orbit and of the ecliptic, their dark surface is turned towards us, and when the sun is in their plane only the narrow edge is illumined; in both of these cases the ring is invisible from the Earth. Its plane being inclined at an angle of 28° to the ecliptic, we see the two surfaces of the ring alternately for periods of 15 years at a time; and at the middle of each period, the rings attain their maximum obliquity to the ecliptic, and are then best seen from the Earth. It is hardly necessary to remark that at the end of each period they become invisible. Saturn has also no less than ~~seven~~ ^{eight} satellites, seven of which revolve round it in the plane of the ring, and the eighth, which is the second in size, is inclined to it. Two of the satellites were discovered by Herschel in 1787 and 1789, four by Cassini in 1684, one by Huyghens in 1655, and one by England and Professor Bond in 1846. The satellites are all situated

outside of the ring, and the largest of them is nearly equal to the planet Mars in size.—*Uranus*, the next planet in position, was discovered accidentally by the elder Herschel on 13th March 1781, and was named 'the Georgium Sidus' and 'Herschel,' but these names soon fell into disuse. It is about 96 (some astronomers say 82) times greater than the Earth in volume, and 20 (according to others, 15) times in mass; but though so large, its distance is so much greater in proportion that astronomers have been unable to gain much information concerning it. No spots or belts have hitherto been discovered on its surface, and consequently its time of rotation and the position of its axis are unknown. It is attended by a number of satellites, but so minute do these bodies appear, that astronomers hitherto have been unable to agree as to their exact number; Sir William Herschel reckoned six, while other astronomers believe in the existence of four, five, and eight respectively. That there are at least four is without doubt.—The next and outermost member of the solar system is *Neptune*, which, at a distance of nearly 3000 millions of miles from the centre of the system, slowly performs its revolution round the sun, accomplishing the complete circuit in about 165 solar years. It is about 84 times larger than the Earth, but from its extreme remoteness is of almost inappreciable magnitude when seen through an ordinary telescope. It was the disturbance in the motion of Uranus caused by the attractive force of this planet which led Leverrier and Adams to a calculation of its size and position, on the supposition of its existence, and the directions which were given by the former to Dr Galle of Berlin, specifying its exact position in the heavens, led that astronomer to its discovery on 23d September 1846. Mr Lassell of Liverpool has discovered that Neptune is attended by one satellite. The satellites of Uranus and Neptune differ from the other planets, primary and secondary, in the direction of their motion, which is from east to west, and in the case of the former, in planes nearly perpendicular to the ecliptic. Both Uranus and Neptune were observed long before the times of Herschel and Leverrier, but they were always supposed to be stars. Uranus is known to have been observed by Flamsteed between 1690 and 1715, and Neptune by Lalande in 1795. For the periods, distances, size, density, &c., of the planets, see SOLAR SYSTEM. In astronomical tables, almanacs, &c., the planets are for convenience denoted by symbols instead of their names, as follows: Mercury, ☿; Venus, ♀; Earth, ⊕; Mars, ♂; the Planetoids, in the order of their discovery, ⓪, ①, ②, ③, &c.; Jupiter, ♃; Saturn, ♄ or ♅; Uranus, ♅; Neptune, ♆; the Sun, ☉; the Moon, ☾.

PLANT, a living organic being, destitute of any indication of mind or feeling, and sometimes defined as essentially differing from an animal in the want of voluntary motion. Plants are the organisms which form the *Vegetable Kingdom*. The science which treats of plants is called Botany (q. v.), of which there are several important branches.

The difference between plants and animals is sometimes difficult to discern, but only in some of the groups, which must of necessity be referred to the lowest place whether in the animal or vegetable kingdom. Plants of higher organisation can never be mistaken for animals, nor animals of higher organisation for plants. Instead of a regular ascending and descending scale of organisms, from the highest animal to the lowest plant, we find a widely-extended base from which the ascent seems to begin at once in both the organic kingdoms, with many ramifications in each; and perhaps that we do not at once recognise the difference even in the lowest

satellite was suspected by it his observation has

planets. The name planet is of considerable antiquity, and was applied to these dependents of the sun to distinguish them from the myriads of luminous bodies which stud the sky, and which present to the naked eye no indication of change of place (see STARS). The planets at present known are, in the order of their distance from the sun, Mercury, Venus, the Earth, Mars, the Planetoids (q. v.), Jupiter, Saturn, Uranus, and Neptune. Six of these, Mercury, Venus, the Earth (which was not, however, then reckoned a planet), Mars, Jupiter, and Saturn, were known to the ancients; Uranus was discovered by Sir William Herschel (q. v.) in 1781; and Neptune, after having its position and elements determined theoretically by Leverrier and Adams, was discovered by M. Challis, and afterwards by Dr Galle, in 1846. The Planetoids, which now number 81, have all been discovered during the present century. Five of the planets, the Earth, Jupiter, Saturn, Uranus, and Neptune, are attended by one or more satellites; Uranus (generally), Neptune, almost the whole of the Planetoids, and all the satellites except the Moon, are invisible to the naked eye. The visible planets can be at once distinguished from the fixed stars by their clear steady light, while the latter have a sparkling or twinkling appearance. The comparative proximity of the planets may be proved by examining them through a telescope of moderate power, when they appear as round luminous disks, while the fixed stars exhibit no increase of magnitude. The planets, as observed from the Earth, move sometimes from west to east, sometimes from east to west, and for some time remain stationary at the point where progression ends and retrogression commences. This irregularity in their movements was very puzzling to the ancient astronomers, who invented various hypotheses to account for it. See PTOLEMAIC SYSTEM and EPICYCLE. The system of Copernicus, by assuming the sun, and not the earth, as the centre of the system, explained with admirable simplicity what seemed before a maze of confusion.

The planetary orbits differ considerably in their degrees of excentricity, the Planetoids, Mars, and Mercury being most, and the larger planets least excentric. No two planets move exactly in the same plane, though, as a general rule, the planes of the larger planets most nearly coincide with that of the ecliptic. The latter are consequently always to be found within a small strip of the heavens extending on both sides of the ecliptic; while the others have a far wider range, Pallas, one of them, having the angular elevation of its orbit no less than $34^{\circ} 35'$ above the ecliptic. According to Kepler's Laws (q. v.), the nearer a planet is to the sun the shorter is the time of its revolution. The arrangement of the planets in the solar system bears no known relation to their relative size or weight, for though Mercury, Venus, and the Earth follow the same order in size and distance from the sun, yet Mars, which is further from the sun, is much less than either the Earth or Venus, and the Planetoids, which are still further off, are the least of all. Jupiter, which is next in order, is by far the largest, being about $1\frac{1}{4}$ times as large as all the others together; and as we proceed further outwards, the planets become smaller and smaller, Saturn being less than Jupiter, Uranus than Saturn, and Neptune than Uranus.

With reference to their distance from the sun, as compared with that of the Earth, the planets are divided into *superior* and *inferior*; Mercury and Venus are consequently the only 'inferior' planets, all the others being 'superior.' The inferior planets must always be on the same side of the Earth as the sun is, and can never be above the horizon of

any place (not in a very high latitude) at midnight; they are always invisible at their superior and inferior conjunctions, except when, at the latter, a *Transit* (q. v.) takes place. The superior planets are likewise invisible at conjunction, but when in opposition they are seen with the greatest distinctness, being then due south at midnight. The time which elapses from one conjunction to its corresponding conjunction is called the *synodic period* of a planet, and in the case of the inferior planets must always be greater than the true period of revolution.

Mercury, the planet which is nearest the sun, is also, with the exception of the Planetoids, the smallest (being only 3 times the size of the moon), and performs its revolution round the sun in the shortest time. Its greatest elongation is never more than $28^{\circ} 45'$, and consequently it is never above the horizon more than two hours after sunset, or the same time before sunrise; on this account, and from its small apparent size ($5''$ to $12''$), it is seldom distinctly observable by the naked eye. It shines with a peculiarly vivid white or rose-coloured light, and exhibits no spots—*Venus*, the next in order of distance and period, is to us the most brilliant of all the planets. Its orbit is more nearly a circle than any of the others, and when at its inferior conjunction, it approaches nearer the Earth than any other planet. Its apparent angular dimensions thence vary from $10''$ at the superior, to $70''$ at the inferior conjunction. Its greatest elongation varies from 45° to $47^{\circ} 12'$, and therefore it can never be above the horizon for much more than three hours after sunset, or the same time before sunrise. While moving from the inferior to the superior conjunction, Venus is a *morning star*, and during the other half of its synodic period an *evening star*. When this planet is at an elongation of 40° , its brilliancy is greatest, far surpassing that of the other planets, and rendering a minute examination through the telescope impossible. At this period it sometimes becomes visible in the daytime, and after sunset is so bright as to throw a distinct shadow. Astronomers have repeatedly attempted to ascertain the nature and characteristics of its surface, but its brightness so dazzles the eyes as to render the correctness of their observations at best doubtful. From the changes in the position of dusky patches on its surface, which have been frequently noticed, it is concluded that it revolves on its axis, and that its equator is inclined to the plane of its orbit at an angle of 75° , but many astronomers (Sir John Herschel included) profess to doubt these conclusions. Both Venus and Mercury necessarily exhibit phases like the moon.—The *Earth*, the next planet in order, will be found under its own name; it has a single satellite, the *Moon* (q. v.).—*Mars*, the first of the superior planets, is much inferior in size to the two previous, its volume being about $\frac{1}{4}$ th of the Earth's, and, after Mercury, its orbit is much more excentric than those of the other planets. When it is nearest to the Earth (i. e., in opposition), its apparent angular diameter is $30''$; but when furthest from it (i. e., in conjunction), its diameter is not more than $4''$. Mars is less known than the rest of the superior planets, owing to its not possessing a satellite, by the motions of which its attractive force (and hence its mass and density) could be estimated. It shines with a fiery red light, and is a brilliant object in the heavens at midnight when near opposition; when seen through the telescope its surface appears to be covered with irregular blotches, some of them of a reddish, others of a greenish colour, while at each pole is a spot of dazzling white. The red spots are surmised to be

PLANTAIN.

capsules with a lid. The *testa* of the seeds abounds in mucilage, which is easily extracted by boiling water. The order is allied to *Plumbaginæ* and *Primulacæ*. There are about 120 known species, diffused over all parts of the globe, but most abundant in temperate and cold countries. The most important genus is *Plantago*, the species of which often receive the English name PLANTAIN. Five of this genus are found in the United Kingdom, the chief of which are the following: the GREATER PLANTAIN, or WAYBREAD (*P. major*), one of the most common of British plants; a perennial, with broad ovate stalked leaves and long cylindrical spikes, growing in pastures, waysides, &c. It is very widely diffused over the world. Its seeds are a favourite food of birds, and the gathering of the spikes to feed cage-birds is familiar to every one. The leaves are applied to wounds by the peasantry in many districts. They are said also to be a useful application to ulcers and indolent scrofulous tumours. —The RIBWORT PLANTAIN, or RIBGRASS (*P. lanceolata*), is another very common British plant, forming no small part of the herbage of many meadows and pastures, and sometimes sown by farmers, because its foliage is produced early in the season, and is then acceptable to oxen, sheep, and horses; but deemed most suitable for poor soils, as its spreading leaves occupy too much of the ground, and choke better grasses in rich land. Its leaves are lanceolate, and taper at both ends; its spikes are short, ovate or cylindrical, and placed on long angular stalks. Its seed is acceptable to cage-birds. This is the plant, commonly known as 'bullies,' or 'soldgers,' the striking off the heads (or spikes) of which is such a favourite amusement of children. —The mucilage of the seeds of *Plantago ispaghula* and of *P. psyllium* is much used in India in catarrhs and other complaints; and *P. psyllium*—called FLEAWORT, and its seeds FLEA-SEED—is cultivated in France for the sake of this mucilage, which is used by paper-stainers in preference to that obtained from linseed, and is also extensively used by muslin manufacturers for stiffening their goods. The plant has a branched spreading stem, and recurved leaves.

PLANTAIN (*Musa Paradisiaca*), a most important food-plant of tropical countries, and one of the largest of herbaceous plants, belongs to the natural order *Musaceæ* (q. v.), and is a native of the East Indies, where numberless varieties of it have been cultivated for thousands of years. It is now diffused over all the tropical and subtropical regions of the globe. It must have been carried to America soon after or during the days of Columbus, for its fruit was a principal article of food there in the first half of the 16th c.; but there is nothing to support the conjecture of Humboldt that there may be different species cultivated under the name of P., and some of them natives of America. The P. is now, however, cultivated to the furthest depths of the primeval American forests, accompanies the Indians in their frequent changes of residence, forms the wealth of many occupiers of land in the vicinity of great towns, where large plantations of it are made, and is a true staff of life to the population of all colours and classes in tropical countries. In many regions it is the principal article of food.

In the genus *Musa* there arise from the midst of the leaves—or apparently from the top of the stem, the sheathing bases of the leaves forming a tree-like false stem—stalks which bear great spikes of flowers, each enclosed in a large bract or spathe; the flowers, and afterwards the fruit, are arranged in clusters or almost in whorls on the stalk; the flowers have a perianth of six segments, five of which cohere as a tube slit at the back, and the sixth is small and concave; there are six stamens,

one or more of them imperfect; the gynoecium is inferior, 3-celled, with two rows of ovules in each cell; the fruit is fleshy, and has many seeds imbedded in its pulp. The name *Musa* is derived from the Arabic *muz*, a plantain; the P. seems to be known by Pliny under the name *pala*, a name probably derived from an eastern root, from which also the name *plantain*. The specific name *Paradisiaca* alludes either to a fancy that the P. was the forbidden fruit of Eden, or to a legend that the aprons which our first parents made for themselves were of P. leaves.

The stem of the P. is usually 15 or 20 feet high, although there are varieties having a stem of six feet. The leaves are very large, the broadest being sometimes ten feet long and three feet wide, undivided, of a beautiful shining green; the petioles are strong and fleshy. The fruit is oblong, varying in its usual long shape to an almost spherical, and obscurely angular, eight inches to a foot long. The varieties commonly known by the name Plantain—the fruit is usually cooked or prepared in some way in order to be eaten, and very often used as a substitute for bread; whilst the smaller varieties, of which the fruit is eaten raw, are generally known by the name Banana (q. v.). The names, however, being somewhat variously used.

The P. is generally propagated by suckers, a sucker attains maturity in about eight months or a year after being planted. The stem is cut down after fruiting, but the plantation does not require renewal for 15 or 20 years. The plants ought to be at least ten feet apart in plantations of them, or six feet in single rows around the gardens. The P. has been sometimes cultivated with success in hothouses.

With the exception of two or three plants it would not be easy to name, in the whole vegetable kingdom, any plant which is applied to a greater number of uses than the plantain. The fruit is sometimes eaten raw, although more generally except that of the banana—boiled or roasted, and variously prepared. It is both farinaceous and saccharine. In most of the varieties it has a sweet taste; in some it is mealy; and in some it is acid or austere. It is as much used before it is perfectly ripe as when it is so. In the West Indies the P. boiled and beaten in a mortar is a common food of the negroes. Plantains baked in their skins, or fried in slices with butter and pressed over with sugar, are favourite dishes in several tropical countries. They are preserved by drying in the sun or in ovens, and pressed into masses, which state they keep for years, and furnish a valuable article of food. The unripe fruit, peeled, dried, and powdered, is called *P. meal*, and in Guiana *Conquintay*; it is whitish with black specks, a fragrance like orris-root, and a taste like wheat-flour; and is made into excellent and nourishing dishes. A good and wholesome starch is obtained from the P. by rasping and washing. A decoction of the fruit is a common beverage, and a kind of wine is obtained from it by fermentation. —The top of the stalk is a good boiled vegetable. The leaves are much used for packing and other purposes; the fibre of their stalks is used for textile purposes and for cordage; and it is probable that it might be used for paper making. hitherto the leaves and stems of plantains have been generally burned or left to rot.

So great is the food produce of the P., according to Humboldt's calculation, it is equal to that of the potato as 44 to 1, and to that of wheat as 133 to 1. The P. requires little attention.

The name P. is frequently extended to the genus *Musa*. Wild species, with austere taste,

PLANUDÉS, MAXIMUS. See **ANTHOLOGY**.

PLASEN'CIA, an ancient and much-decayed, but most picturesque town of Spain, in Estremadura, 43 miles north-north-east of Cáceres, stands on a steep hill, with beautiful and fertile valleys, extending on the north-west and south-east sides. It is almost wholly girdled by the clear waters of the *Verte*; and the surrounding scenery, embracing city, castle, river, rock, and mountain, and over-arched by a sunny and unclouded sky, is remarkably beautiful. The city contains the picturesque remains of an ancient castle, and is surrounded by crumbling walls, surmounted by 68 towers, and pierced by six gates. Water is brought to the town by an aqueduct of 80 arches. There are seven Gothic churches, an episcopal and several other palaces, and the cathedral, an ornate Gothic edifice, begun in 1498, and some portions of which are still unfinished, while others have been altered and disfigured. The cathedral contains many noble tombs, with effigies. P., once a flourishing and important city, was founded in 1190. It now carries on some minor manufactures of cotton, woollen, and hempen fabrics, and of hats and leather. Pop. about 6000.

PLA'SMA, a silicious mineral, a variety of quartz or chalcedony, of a dark-green colour, black when unpolished and seen by reflected light, but very translucent when held between the eye and the light. It is very nearly allied to heliotrope or bloodstone, but has no red spots, is more translucent, and is not susceptible of so brilliant a polish. It is never found crystallised. It is a rare mineral, and the finest specimens are brought from India and China. It was highly prized by the ancient Romans, who wrought it into ornaments of various kinds; and very fine engraved specimens have been found among the ruins of ancient Rome. The ancients are said to have obtained their plasma from Mount Olympus, in Asia Minor. The name plasma is supposed to be identical with the Greek *prason*, a leek, the *r* having passed into *l*.

PLASTER OF PARIS. See **GYP SUM**.

PLASTERING, the art of covering walls, partitions, ceilings, &c., with a composition of lime mixed with sand and hair. It is usually done in three coats. The first coat is the solid foundation on which the rest is placed; it is therefore of a good thickness, and is hatched or crossed with lines, so as to give a bond for the next coat. The first coat is allowed to dry thoroughly; then the second coat is floated over the first, and rubbed well in with a flat board, about 12 inches square, so as to bring it all to a fair and equal surface (in Scotland this is called the 'straightening'); and before the second coat has thoroughly dried, the third or finishing coat is applied in finer materials, and in a more liquid state. In the case of ceiling cornices, mouldings, &c., plaster of Paris or stucco is generally used. This sets or hardens more rapidly than lime, and has a finer and whiter surface.

Ornaments (called enrichments) are generally composed of plaster of Paris, and cast in moulds. They are then set in their places after the cornice has been made, or *run*.

PLASTERS are a class of medicinal agents which are employed externally with various objects. They are solid and tenacious compounds, adhesive at the ordinary temperature of the body, and owing their consistency—1. To the chemical combination of oxide of lead, with one or more fatty acids; or 2, to a due admixture of wax, or fat, and resin; or 3, to the chemical action of the component parts of the plaster on each other. Strictly speaking, the term *Plaster* should be restricted to the

first class of compounds; viz., to combination of oxide of lead with fatty acids. In the British Pharmacopœia, there are directions for making 12 plasters, viz., ammoniac and mercury plaster, Belladonna plaster, cantharides plaster, chalybeate plaster, galbanum plaster, litharge (or lead) plaster, mercurial plaster, opium plaster, pitch plaster, resin plaster, soap plaster, and warm plaster. The litharge (or lead) plaster, directly or indirectly, enters into the composition of all the twelve official plasters, excepting those of ammoniac and mercury, cantharides, and pitch. *Lead Plaster*, which is usually sold under the name of *Diachylon*, in combination with resin, constitutes the ordinary *adhesive plaster*. The best plaster of this kind for strapping is composed of a mixture of six drachms of resin with a pound of lead plaster. The *cantharides plaster* and the *ammoniac and mercury plaster*, are examples of the second and third varieties.

Plasters are generally kept in rolls; and when they are to be used, they are melted at a temperature of not more than 212°, and spread on soft leather. They are employed to answer two distinct indications, namely, to act *mechanically*, as by affording artificial support to weak muscular structures, by preventing threatened or tedious excoriations, by protecting parts already excoriated from the action of the air, &c.; and to act *medicinally* as stimulant, discutient, alterative, anodyne, &c.

PLATA, LA. See **ARGENTINE REPUBLIC**.

PLATA, RIO DE LA, a wide estuary of South America, between Uruguay on the north and the Argentine Confederation on the south, forms the mouth of the Parana (q. v.) and the Uruguay (q. v.). It is 180 miles long, 29 miles broad at Buenos Ayres, and 130 miles broad at its mouth, between Punta Negra and Cape San Antonio. At its mouth it is, on an average, only about 10 fathoms deep; at Monte Video it is only 3 fathoms; and at Buenos Ayres about 16 feet deep. Some conception of the vast volume of water which this estuary carries to the Atlantic may be had when it is remembered that with its affluents it drains an area of 1,250,000 square miles. The strong and irregular currents, and the sudden tempests of the La P., render its navigation extremely dangerous. It is estimated that through this estuary about one-fourth of the produce of South America is brought to market. For the navigation of its affluents, see **PARAGUAY**, **PARANA**, and **URUGUAY**.

PLATÆA, or **PLATÆÆ**, a city in the western part of Boeotia, on the borders of Attica, and at the foot of Mount Cithæron. It was about 6½ miles from Thebes. In 480 B.C., it was destroyed by the Persians, because the inhabitants had taken part with Athens in the battle of Marathon; but in the following year, it was the scene of the glorious victory won by the Lacedæmonian Greeks, under Pausanias and Aristides, over the Persian horde commanded by Mardonius—a victory that finally delivered Greece from the threatened yoke of the invader. In the third year of the Peloponnesian war (429 B.C.), it was attacked by a Theban-Lacedæmonian force—for the Plataeans were firm friends of Athens—and heroically defended itself for more than two years, until it was starved into surrender. The little garrison of about 200 men were put to the sword, and the city was razed to the ground. Such of the Plataeans as escaped were hospitably received at Athens. By the treaty of Antalcidas (387 B.C.), their children were allowed to go back again, and rebuild their city, after an exile of 40 years; but they were again driven out by their implacable enemies, the Thebans; and half a century elapsed before the victory of Philip of

PLATINUM.

brass and bronze, are all now deposited under patent processes. Of all these, by far the most important is the deposit of the alloys, and a very large trade has sprung up in manufactures of iron coated with brass. The importance of being able to cover a metal so cheap, yet so easily corroded as cast iron, with so ornamental an alloy as brass or bronze, can hardly be overrated. Many extensive and satisfactory pieces of this work have already been made.

PLATINUM (symb. Pt, equiv. 99, sp. gr. 21.5) is one of the 'noble metals,' which may be obtained in more forms than one. It is only found in the native state, usually occurring in small glistening granules of a steel-gray colour, which always contain an admixture, in varying proportions, of several metals, most of which are rarely found except in association with platinum. Sometimes, however, it is found in masses of the size of a pigeon's egg, and pieces weighing ten or even twenty pounds have occasionally been found. The following table shews the composition of crude platinum ore as obtained from different parts of the globe. The analyses were conducted by Messrs Deville and Debray.

	Colum- bia.	Cali- fornia.	Ore- gon.	Spain.	Austra- lia.	Russia.
Platinum, . . .	80.00	79.35	51.45	45.70	59.30	77.50
Iridium, . . .	1.55	4.20	0.40	0.95	2.20	1.45
Rhodium, . . .	2.50	0.65	0.65	2.65	1.50	2.80
Palladium, . . .	1.00	1.95	0.15	0.85	1.50	0.85
Gold, . . .	1.50	0.55	0.85	3.15	2.40	...
Copper, . . .	0.65	0.75	2.15	1.05	1.10	2.15
Iron, . . .	7.20	4.45	4.30	6.80	4.30	9.60
Osmide of Iridium, . . .	1.40	4.95	37.30	2.85	25.00	2.35
Sand, . . .	4.35	2.60	3.00	35.95	1.20	1.00
Osmium and loss, . . .	...	0.65	...	0.05	0.80	2.30

Ruthenium is also almost always present, and in the above analyses is probably included with the iridium, which it closely resembles.

There are two modes of obtaining platinum in the form of ingots from the ore, both of which require notice. The method which has been universally employed, till within the last five years, was that discovered by Wollaston, the leading steps of which were as follows: After the removal of the metals associated with the platinum, by the successive action of nitric and hydrochloric acids, the platinum itself is dissolved in aqua regia, from which it is precipitated by a solution of sal ammoniac in the form of a sparingly soluble double salt, the chloride of ammonium and platinum, represented by the formula $H_2NCl.PtCl_2$. This salt is washed and heated to redness, by which means the chlorine and ammonia are expelled, leaving the metal in the form of a gray, spongy, soft mass, known to chemists as *spongy platinum*. In this form, it is very finely powdered under water, is next shaped by intense pressure into a mass, and is then exposed to an intense heat in a wind-furnace, the ingot being formed by hammering it upon its two ends. (If hammered on its sides, it splits.) This heating and forging must be repeated till the metal becomes homogeneous and ductile.

Deville and Debray have introduced an entirely new method for the extraction of platinum from its ores. They first form a fusible alloy of this metal with lead, by exposing the platinum ore—2 cwt. being used in a single experiment, with equal weights of galena and litharge gradually added, and a little glass to act as a flux—to full redness in a reverberatory furnace lined with clay. The sulphur of the galena is oxidised and expelled, and the liquid alloy of lead and platinum is allowed to rest for some time, to allow the osmide of iridium, which is not affected by the preceding operations, to sink to the bottom. The upper

portions of the alloy are then decanted, and cast into ingot-moulds, which are submitted to cupellation; and the metallic platinum which is left after the cupellation is melted and refined in a furnace of lime—which is employed in consequence of its being a very bad conductor of heat—by means of the oxyhydrogen blowpipe. The platinum obtained in this manner is nearly pure, and very ductile and malleable. For details regarding this process, which has been patented both in France and in this country, the reader is referred to the memoir, 'On Platinum and the Metals which accompany it,' in the *Annales de Chimie et de Physique* for August 1859.

Platinum, as obtained by either of the above processes, exhibits a bluish-white metallic lustre; it is exceedingly malleable and ductile, and is very infusible, melting only before the oxyhydrogen blow-pipe, or in a very powerful blast-furnace, such as that used by Deville and Debray. It expands less by heat than any other metal, and it is usually regarded as the heaviest form of matter yet known; but, according to Deville and Debray, osmium and iridium are about equally dense. It is unaffected by atmospheric action, and does not undergo oxidation in the air at even the highest temperatures. It is not acted on by nitric, hydrochloric, sulphuric, or hydrofluoric acid, or in short, by any single acid; but in aqua regia it slowly dissolves, and forms a soluble bichloride. In consequence of its power of resisting the action of acids, it is of great service in experimental and manufacturing chemical processes, platinum spatulas, capsules, crucibles, &c., being employed in every laboratory; while platinum stills, weighing sometimes as much as one thousand ounces, are frequently used for concentrating oil of vitriol. Platinum is, however, corroded if heated with the alkalies or alkaline earths, and especially with a mixture of nitrate of potash and hydrated potash, an oxide being formed which combines with the alkaline bases.

The form of the metal known as *spongy platinum* has been already noticed. The metal may, however, be obtained in a state of subdivision much finer than that in which it is left on heating the double chloride of platinum and ammonium—namely, in the state known as *Platinum Black*. In this form it resembles soot. It may be prepared in various ways, of which one of the simplest is to boil a solution of bichloride of platinum, to which an excess of carbonate of soda and a quantity of sugar have been added, until the precipitate formed after a little time becomes perfectly black, and the supernatant liquid colourless. The black powder is then collected on a filter, washed, and dried by a gentle heat. In its finely comminuted state, either as spongy platinum or platinum black, it possesses a remarkable power of condensing and absorbing gases, one volume of platinum black being able to absorb more than 100 volumes of oxygen. This absorption appears to be accompanied by a conversion of some or all of the oxygen into the modification known as Ozone (q. v.), since the metal becomes capable of exerting the most energetic oxidising action, even at ordinary temperatures. For example, it can cause the combustion of a jet of hydrogen, can oxidise sulphurous acid into sulphuric acid, ammonia into nitric acid, and alcohol into acetic acid, the rise of temperature in the last case being often sufficiently great to cause inflammation. Platinum in the compact form, as foil or wire, possesses similar powers, but in a far lower degree.

Platinum may be easily alloyed with most of the metals, the alloys being in general much more fusible than pure platinum. Hence care must be taken not to heat the oxides of metals of easy reduction, such as lead and bismuth, in platinum

marble temple, finds he has only bricks to build it with. For this reason, extremely practical men, and those who are compelled to reason chiefly by an extensive induction from external facts, have ever felt an instinctive aversion to the Platonic philosophy; and P. himself, by some of the strange and startling conclusions, in matters of social science, to which his ideal philosophy led, has, it must be confessed, put into the hands of his adversaries the most efficient weapons by which his ideal system may be combated.

The starting-point of the Platonic philosophy, as, indeed, it must be of all philosophy, properly so called, is the theory of knowledge. This is set forth in the *Theætetus*, the *Sophistes*, and the *Parmenides*; and in the *Cratylus*, the foundations are laid for a science of language, as the necessary product of a creature energising by ideas. The Platonic theory of knowledge, as developed in the *Theætetus*, will be most readily understood by imagining the very reverse of that which is vulgarly attributed to Locke; viz., by drawing a strong and well-marked line between the province of thought and that of sensation in the production of ideas, and taking care that, in the process of forming conceptions, the mind shall always stand out as the dominant factor. In other words, the hackneyed simile of the sheet of blank paper, applied to the mind by extreme sensational philosophers, must either be thrown away altogether or inverted; the more active part of the operation must always be assigned to the mind. The formation of knowledge, according to P., may be looked on as the gradual and systematic elimination of the accidental and fleeting in the phenomenon from the necessary and permanent; and the process by which the mind performs this elimination—and it can be performed only by mind—is called *Dialectics*. This word, from *diálogos*, originally signifies only conversational discussion; thence, that discussion conducted in such scientific fashion as to lead to reliable results, i.e., strictly logical. The product of dialectics is ideas, and these ideas being the *eidè*, forms or types of things which are common to all the individuals of a species, all the species of a genus, all the genera of a family, and all the families of a class, generate classification—that is, knowledge of the permanent in phenomena—and definition, which is merely the articulate verbal expression of this permanency. The construction of the confused results of observation into the orderly array of clear conceptions, by a sort of cross-examination of the phenomena, performed by minds impassioned for truth, is exhibited as the great characteristic of the teaching of Socrates, in the *Memorabilia* of Xenophon. In the dialogues of P., the same purification of the reason, so to speak, from the clouds of indistinct sensuousness, is exhibited on a higher platform, and with more comprehensive results. For between Socrates and P., notwithstanding a deep internal identity, there was this striking difference in outward attitude—that the one used logic as a practical instrument in the hands of a great social missionary and preacher of virtue; while the other used it as the architect of a great intellectual system of the universe, first and chiefly for his own time and his own place, but, as the event has proved, in some fashion also for all times and all places.

We should err greatly, however, if we looked on P. as a man of mere speculation, and a writer of metaphysical books, like certain German professors. Neither P. nor any of the great Greeks looked on their intellectual exercises and recreations as an end in themselves. With them, philosophy did not mean mere knowledge or mere speculation, but it

meant wisdom, and wisdom meant wise action, and wise action meant virtue. The philosophy of P., therefore, with all its transcendental flights, of which we hear so much, was essentially a practical philosophy; all his discussions on the theory of knowledge and the nature of ideas are undertaken mainly that a system of eternal divine types, as the only reliable knowledge, may serve as a foundation for a virtuous life, as the only consistent course of action. Virtue, with Socrates and P., is only practical reason. As in the Proverbs of Solomon, all vice is folly, so in the philosophy of P., the imperial virtue is *phronêsis*—i.e., 'wisdom' or practical 'insight.' The other two great Greek and Platonic virtues—*sôphrosynê*, 'moderation' or 'soundmindedness,' and *dikaïosynê*, 'justice,' or the assigning to every act and every function its proper place—are equally exemplifications of a reasonable order applied to action—such an order as alone and everywhere testifies the presence of mind. The theory of morals as worked out from such principles is, of course, as certain as the necessary laws of the reason which it expresses; and accordingly, the Platonic morality, like the Christian, is of that high order which admits of no compromise with ephemeral prejudice or local usage. The contrast between the low moral standard of local respectability and that which is congruous with the universal laws of pure reason, stands out as strikingly in Plato, as the morality of the Sermon on the Mount in the Gospels does against the morality of the Scribes and Pharisees. Splendid passages to this effect occurs in various parts of P.'s writings, particularly in the *Republic* and the *Gorgias*. In perfect harmony with the Platonic theory of noble action, is his doctrine with regard to pure emotion and elevated passion. Love with P. is a transcendental admiration of excellence—an admiration of which the soul is capable by its own high origination and the germs of godlike excellence, which are implanted into it from above. The philosophy of love is set forth with imaginative grandeur in the *Phædrus*, and with rich dramatic variety in the *Banquet*, of which dialogue there is an English translation by Shelley. The philosophy of beauty and the theory of pleasure are set forth with great analytic acuteness in the *Philebus*. With P., the foundation of beauty is a reasonable order, addressed to the imagination through the senses—i.e., symmetry in form, and harmony in sounds, the principles of which are as certain as the laws of logic, mathematics, and morals—all equally necessary products of eternal intellect, acting by the creation and by the comprehension of well-ordered forms, and well-harmonised forces, in rich and various play through the living frame of the universe; and the ultimate ground of this lofty and coherent doctrine of intellectual, moral, and æsthetic harmonies lies with P., where alone it can lie, in the unity of a supreme, reasonable, self-existent intelligence, whom we call God, the fountain of all force, and the creator of all order in the universe; the sum of whose most exalted attributes, and the substantial essence of whose perfection may, as contrasted with our finite and partial aspects of things, be expressed by the simple term *tò agathon*—the Good. From this supreme and all-excellent intelligence, human souls are offshoots, emanations, or sparks, in such a fashion, that they partake essentially of the essential nature of the source from which they proceed, and accordingly possess unity as their most characteristic quality, attest their presence everywhere by a unifying force which acts by impressing a type on whatever materials are submitted to it, and is filled with a native joy in the perception of such types, the product of

No other Russian general ever exercised such an influence over the men under his command, and their awe of him was not greater than their affection; but this was doubtless owing to the inflexible and speedy justice which he administered to them, and to the freedom with which he left them to rob and pillage.

PLATONIC LOVE, the name given to an affection subsisting between two persons of different sex, which is presumed to be unaccompanied by any sensuous emotions, and to be based on moral or intellectual affinities. The expression has originated in the view of Plato, who held that the common sexual love of the race, harassed and afflicted with fleshly longings, is only a subordinate form of that perfect and ideal love of truth which the soul should cultivate. Whether such a sentiment as Platonic love can really subsist between persons of different sex, has been frequently disputed; but without pronouncing positively on a point so delicate, and depending so much on differences in our spiritual organisation, it may be safely affirmed, that wherever a feeling—calling itself by this name—exists, it has undoubtedly a tendency to develop into something more definite and dangerous.

PLATOON (probably from the French *peloton*) was a term formerly used to designate a body of troops who fired together. A battalion was commonly divided into 16 platoons, and each company into two platoons, the platoon thus corresponding to the present subdivision. The word is obsolete in this its original sense; but it survives in the expression 'platoon exercise,' which is the course of motions in connection with handling, loading, and firing the musket or rifle.

PLATTE. See **NEBRASKA**.

PLATTEN-SEE. See **BALATON**.

PLATTSBURG, a village of New York, U.S., on the west shore of Lake Champlain, at the mouth of the river Saranac, which furnishes water-power to several mills and factories. It has a custom-house, academy, and nine churches. In Plattsburg Bay was fought the naval battle of Champlain, in which the British flotilla, under Commodore Downie, was defeated by the American commodore M'Donough, September 11, 1814; while the land forces, amounting to 14,000 men, under Sir George Prevost, were defeated by General Macomb. Pop. in 1860, 6680.

PLA'TYPUS. See **DUCK-BILL**.

PLATYSTOMA (Gr. broad-mouth), a genus of fishes of the family *Siluridae*, having a very flat (depressed) snout, and a very large mouth with six long barbels; the skin quite destitute of scales; two dorsal fins; the eyes lateral, level with the nostrils. The species are numerous, some of them attaining a large size, many of them notable for their distinct and conspicuous markings. Several are natives of the rivers of the north-east of South America; and among these are some of the most beautiful and delicious of fresh-water fishes, as *P. tigrinum*, known among different tribes of Indians by various names—*Corutlo*, *Colite*, *Oronni*, &c., which has an elongated body, light blue, transversely streaked with black and white, and a spreading forked tail. It is both taken by baited hooks and shot with arrows by Indians, as are several other species, some of which are found as far south as Buenos Ayres.

PLAU'EN, an important manufacturing town of Saxony, in a beautiful valley on the White Elster, 74 miles south of Leipzig by railway. It was the chief town of the Saxon Voigtland (q.v.), and its castle was at one time the residence of the Voigt,

or advocate, but is now used as the seat of justice and other courts. P. contains a gymnasium, a royal palace, and numerous educational and benevolent institutions. It carries on extensive manufactures of muslin, cambric, and jaconet goods, as well as embroidered fabrics and cotton goods. In September 1844, 150 buildings were destroyed by fire, and after that event, the town was almost wholly rebuilt. Pop. 14,817.

PLAUTUS, **M. ACCIUS**, or, more correctly, **T. MACCIUS**, the great comic poet of Rome, was born about 254 B.C. at Sarsina, a village of Umbria. We have no knowledge of his early life and education; but it is probable that he came to Rome while still a youth, and there acquired a complete mastery of the Latin language in its most idiomatic form, as well as an extensive familiarity with Greek literature. It is uncertain whether he ever obtained the Roman franchise. His first employment was with the actors, in whose service he saved an amount of money sufficient to enable him to leave Rome and commence business on his own account. What the nature of this business was, or where he carried it on, we are not informed; we know, however, that he failed in it, and returned to Rome, where he had to earn his livelihood in the service of a baker, with whom he was engaged in turning a hand-mill. At this time—a few years before the outbreak of the Second Punic War—he was probably about 30 years of age; and while employed in his humble occupation, he composed three plays, which he sold to the managers of the public games, and from the proceeds of which he was enabled to leave the mill, and turn his hand to more congenial work. The commencement of his literary career may, therefore, be fixed about 224 B.C., from which date he continued to produce comedies with wonderful fertility, till 184, when he died in his 70th year. He was at first contemporary with Livius Andronicus and Nevius; subsequently with Ennius and Cæcilius.

Of his numerous plays—130 of which bore his name in the last century of the republic—only 20 have come down to us. Many of them, however, were regarded as spurious by the Roman critics, among whom Varro in his treatise (*Quæstiones Plautinae*) limits the genuine comedies of the poet to 21. With the exception of the 21st, these Varronian comedies are the same as those we now possess. Their titles, arranged (with the exception of the Bacchides) in alphabetical order, are as follows: 1, *Amphitryo*; 2, *Asinaria*; 3, *Aulularia*; 4, *Captivi*; 5, *Curculio*; 6, *Casina*; 7, *Cistellaria*; 8, *Epulicus*; 9, *Bacchides*; 10, *Mostellaria*; 11, *Menæchmi*; 12, *Miles*; 13, *Mercator*; 14, *Pseudolus*; 15, *Penulus*; 16, *Persa*; 17, *Rudens*; 18, *Stichus*; 19, *Trinummus*; 20, *Truculentus*; 21, *Vidularia*. As a comic writer, Plautus enjoyed immense popularity among the Romans, and held possession of the stage down to the time of Diocletian. The vivacity, the humour, and the rapid action of his plays, as well as his skill in constructing plots, commanded the admiration of the educated no less than of the unlettered Romans; while the fact that he was a national poet prepossessed his audiences in his favour. Although he laid the Greek comic drama under heavy contributions, and 'adapted' the plots of Menander, Diphilus, and Philemon with all the license of a modern playwright, he always preserved the style and character native to the Romans, and reproduced the life and intellectual tone of the people in a way that at once conciliated their sympathies. The admiration in which he was held by his contemporaries descended to Cicero and St Jerome; while he has found imitators in Shakspeare, Molière, Dryden, Addison, and Lessing.

of the material and moral prosperity of the city. These hangers-on were the original plebeians, or non-burgesses of Rome, whose numbers were constantly increased by the subjugation of the surrounding cities and states. Thus, tradition states that, on the capture of Alba, while the most distinguished citizens of that town were received among the Roman patricians, the greater part of the inhabitants, likewise transferred to Rome, were kept in submission to the *populus* or patricians of Rome—in other words, swelled the ranks of the plebeians. Similar transfers of some of the inhabitants of conquered towns are assigned to the reign of Ancus Martius. The order of plebeians thus gradually formed, soon exceeded the patricians in numbers, partly inhabiting Rome, and partly the adjoining country. Though citizens, they were neither comprehended in the three tribes, nor in the *curiæ*, nor in the patrician *gentes*, and were therefore excluded from the comitia, the senate, and all the civil and priestly offices of the state. They could not intermarry with the patricians.

The first step (according to traditionary belief) towards breaking down the barrier between the two classes was the admission, under Tarquinius Priscus, of some of the more considerable plebeian families into the three tribes. Servius Tullius divided the part of the city and the adjacent country which was inhabited by plebeians, into regions or local tribes, assigning land to those plebeians who were yet without it. The plebeian tribes with tribunes at their head, formed an organisation similar to that of the patricians. The same king further extended the rights of the plebeians by dividing the whole body of citizens, patrician and plebeian, into five classes, according to their wealth, and forming a great national assembly called the *Comitia Centuriata*, in which the plebeians met the patricians on a footing of equality; but the patricians continued to be alone eligible to the senate, the highest magistracy, and the priestly offices. These newly-acquired privileges were lost in the reign of Tarquinius Superbus, but restored on the establishment of the Republic. Soon afterwards, the vacancies which had occurred in the senate during the reign of the last king, were filled up by the most distinguished of the plebeian equites, and the plebeians acquired a variety of new privileges by the laws of Valerius Publicola. The encroachments on those privileges on the part of the patricians, began the long-continued struggle between the two orders, which eventually led to the plebeians gaining access to all the civil and religious offices, acquiring for their decrees (*plebiscita*) the force of law. Under the Hortensian law (286 B.C.), the two hostile classes were at last amalgamated in one general body of Roman citizens with equal rights. Henceforth, the term *populus* is sometimes applied to the plebeians alone, sometimes to the whole body of citizens assembled in the *Comitia Centuriata* or *Tributa*, and *plebs* is occasionally used in a loose way for the multitude or populace, in opposition to the senatorial party. See PATRICIAN.

PLEBISCITE, the name given, in the political phraseology of modern France, to a decree of the nation obtained by an appeal to universal suffrage. Thus, Louis Napoleon, for example, was chosen president, and subsequently emperor, by a plebiscite. The word is borrowed from the Latin; but the *plebiscitum* of the Romans properly meant only a law passed at the *Comitia Tributa*, i.e., assembly of the *plebs*, or 'commons,' as distinguished from the *populus*, or the 'nobles'; and although it was ultimately obligatory on both classes of the community, it, of course, could only refer to such matters as it was within the province of the *Comitia Tributa* to

legislate upon, and could not fundamentally alter or destroy the constitution.

PLECTOGNATHI, in the system of Cuvier, and also in that of Müller, an order of osseous fishes, but having the skeleton less perfectly ossified than osseous fishes generally; the skin furnished with ganoid scales or spines; and particularly characterised by having the maxillary and premaxillary bones ankylosed or soldered together. The gill-lid and rays are concealed under the thick skin, with only a small opening. The ribs are very short, and there are no distinctly developed ventral fins. The fishes belonging to this order are not many. They are regarded as a connecting link between the osseous and the cartilaginous fishes.

PLEDGE is the depositing of a chattel or movable with a creditor in security of a debt, and is a contract between the parties that the pledgee shall keep the chattel till the debt is paid. In England, when A pledges property with B for a debt, and other debts are incurred, B cannot retain the pledge for the additional debts; but in Scotland, this can be done. When chattels are pledged in England for debt, the pledgee may sell the goods, if the debt is not paid at the time agreed, or within a reasonable time after notice given; but in Scotland this can only be done by getting the authority of the sheriff and a warrant to sell the goods. Owing to the frequent occasions of poor and needy persons to pledge their goods in order to procure advances of money for temporary purposes, the legislature has enacted a code of special laws to regulate these contracts. See PAWNBROKING.

PLEIADÉS, in Greek Mythology, were, according to the most general account, the seven daughters of Atlas and Pleione, the daughter of Oceanus. Their history is differently related by the Greek mythologists: according to some authorities, they committed suicide from grief, either at the death of their sisters, the Hyades, or at the fate of their father, Atlas (q. v.); according to others, they were companions of Artemis (Diana), and being pursued by Orion (q. v.), were rescued from him by the gods by being translated to the sky; all authorities, however, agree that, after their death or translation, they were transformed into stars. Only six of these stars are visible to the naked eye, and the ancients believed that the seventh hid herself from shame that she alone of the P. had married a mortal, while her six sisters were the spouses of different gods. Their names are Electra, Maia, Taygete, Alcyone, Celæno, Sterope (the invisible one), and Merope.

In Astronomy, a group or constellation of six stars placed on the shoulder of Taurus, the second sign of the Zodiac, and forming, with the pole-star and the twin Castor and Pollux, the three angular points of a figure which is nearly an equilateral triangle. Many believe, from the uniform agreement that the P. were 'seven' in number, that the constellation at an early period contained 'seven' stars, but that one has since disappeared; not a very uncommon occurrence.

The name *Poetical Pleiades* is frequently applied to reunions of poets in septenary groups; and this use of the word dates from the time of the Ptolemies—the originator of the first being Ptolemy Philadelphus, who, from the number of the Greek poets that flocked to Alexandria, chose out seven, whom he treated with special distinction, and denominated his *pleiad*. His example was followed by Charlemagne; and the same system was kept up by the 'Compagnie des Sept Mantenadors del gay Saber,' or the 'Compagnie des Sept Troubadours de

the south of England, which contains erratics from Scandinavia. Both the clay and the boulders seem to have been transported to their present position by floating icebergs.

The temperature, however, after a time improved, reducing the extent of the ice-covering, and driving the arctic fauna northwards from our shores. In the Norwich Crag, we find a larger proportion of southern species, only one-sixth of these being truly arctic. This deposit, found in the neighbourhood of Norwich, consists of beds of sand and gravel which contain fresh-water and marine shells, and the bones of large mammalia. Contemporaneous with the Norwich Crag are the marine deposits of the Clyde, at least the older of them, for though the fossils of all the beds have hitherto been grouped together, they certainly represent two periods which differ from each other by reason of the increasing temperature. While these beds were being deposited around the shores, the ice was disappearing from the land. The glaciers were gradually creeping inwards, leaving an ever-increasing margin of bare land between the glaciers and the sea, which they covered with a continuous layer of mud and rubbed stones—the materials taken up in their progress over the surface—and so forming the boulder-clay of Scotland and the north of England. This is a remarkable deposit of unstratified mud, the character and colour of which is influenced by the rocks on which it rests, and from which it was derived. It contains numerous rounded and polished blocks of stone of various sizes, promiscuously scattered through it, the whole seeming to be the result of an irregular pell-mell hurrying forward and deposition of the materials. It has been always a puzzle to geologists (see BOULDER-CLAY); but Mr Geikie, in his recently published Memoir, by shewing it to be the terminal moraine formed by the slowly retreating sheet of glacier-ice, has given an explanation which meets all the singular phenomena connected with it. Connected with the disappearance of glaciers, are the lateral moraines which exist on many hillsides; and perhaps a little later, the long ridges of gravel which are called Kames in Scotland, and Eskers in Ireland. The loamy deposits of the valleys of the Rhine and the Danube, known as the Loess, were formed at this time by the fine mud from the glaciers, with which every torrent rushing from the icy caverns at the termination of a glacier is charged, and which is now forming a similar deposit in some places on the coast of Greenland.

When the glaciers began to disappear, mammalia again occupied the land; their remains, we have already seen, occur in the Norwich Crag. They continued to increase as the conditions for their existence improved. The caves of the British Islands and the continent were inhabited by hyenas, bears, and other wild beasts, which have left their remains buried in the mud at the bottom of the caves. The raised sea-beaches of this period contain the shells of mollusca now living in the neighbouring seas. In many places around the shores of Britain and Ireland, submarine forests are met with dipping down under low water, and exhibiting the stumps and roots of trees, in the position of growth, belonging to species now living in Britain. Some of the older peat-bogs require to be placed also among the later Pleistocene deposits.

The classification, then, of these strata, which we propose, from the light thrown on them by recent observation, may be put into the following tabular form. The subdivisions are the names of recognised deposits, and though arranged in tabular series, the order is not one of strict sequence, representing the superposition of the different beds; they are all very local deposits, and many of them, though

differing in character, were formed contemporaneously.

Post-Glacial.	Peat-bogs.
	Submarine Forests.
Glacial.	Modern Raised Sea-beaches.
	Cave Deposits.
Arctic.	Loess.
	Kames and Eskers.
	Lateral Moraines.
	Boulder-clay.
	Newer Clyde Beds.
	Older Clyde Beds.
	Elle, Errol, and Tirlie Clay Beds.
	Bridlington Beds.

Many speculations have been made as to the causes of the remarkable change of temperature, from the comparatively warm period of the Pleistocene deposits, to the extreme cold of the early Pleistocene strata, and the subsequent gradual return to the warmer temperature of the present period. The most probable is, that it resulted from an extensive depression of the land of the northern hemisphere in some parts, and its elevation in others during the period. Deposits of glacial shells have been found more than 1000 feet above the sea-level in Wales. A depression much less than this, in the Isthmus of Panama, would give a different direction to the Gulf Stream, and so deprive Western Europe of its benignant influences. It would also put the immense sandy Sahara under water; and that it has been so at a comparatively recent period, has been clearly established by the discovery lately of existing marine shells (including *Cardium edule*) over an extensive district of the desert. Without the Sahara, the south of Europe would have no burning dry sirocco, which now melts the glaciers of the Alps; but instead, a comparatively cold sea-breeze, laden with moisture, which would to a large extent feed them. The existence of a greater quantity and a higher elevation of land near the North Pole would also depress the temperature. These and similar causes would do much, if they were not in themselves sufficient, to produce the extreme cold of the arctic period.

The classification of the British strata will suit, in a general way, the whole of the North Temperate Zone, for throughout the whole of the northern regions of Europe, Asia, and America, similar conditions existed, producing similar physical changes, and the whole region formed one zoological province inhabited by the Mammoth, Mastodon, and their contemporaries. A warmer climate prevailed at this period in South America, and the fossil animals there belong to types still peculiar to that continent, though of a size immensely greater than their living representatives. The Megatherium, Mylodon, and Megalonyx were the gigantic fore-runners of the living sloth; and the small armadillos were anticipated by the Glyptodon. The llamas, opossums, tapirs, and prehensile-tailed monkeys are the diminutive representatives of similar forms in the Pleistocene period. The peculiar marsupial fauna of Australia had also its gigantic fore-runners during this period. The skull of one species (*Diprotodon*, an animal between the kangaroo and the wombat), now in the British Museum, measures three feet in length. The huge wingless *Dinornis*, and its allies of New Zealand, were nearly allied to the small wingless *Apteryx*, now living in that island.

The question of the antiquity of man is intimately associated with the Pleistocene deposits. Whatever be the age of the beds in which either the remains of man or works of art have been found, it is certain that none of them pass the horizon of the boulder-clay. It is, however, equally certain that undoubted evidences of his existence contemporaneously with the mammoth and woolly rhinoceros,

PLETHORA—PLEURISY.

PLETHORA (Gr. 'fulness' or 'excess'), designates a general excess of blood in the system. It may arise either from too much blood being made, or from too little being expended. The persons who become plethoric are usually those in thorough health, who eat heartily and digest readily, but who do not take sufficient bodily exercise, and do not duly attend to the action of the excreting organs. With them, the process of blood-making is always on the increase, and the vessels become more and more filled, as is seen in the red face, distended veins, and full pulse. The heart is excited and over-worked, and hence palpitation, shortness of breath, and probably a sleepy feeling, may arise; but these symptoms, instead of acting as a warning, too often cause the abandonment of all exercise, by which the morbid condition is aggravated. The state of plethora thus gradually induced may be extreme without any functions materially failing, and yet the subject is on the verge of some dangerous malady, such as apoplexy, or structural disease of the heart or great vessels, or of the lungs, kidneys, or liver.

Plethora is said to be *sthenic* when the strength and irritability of the muscular fibres (especially of the heart and arteries) are fully or excessively developed. This form commonly affects the young and active, and those of sanguineous nature. The blood is rich in red cells and fibrine; and there is a tendency to general febrile excitement, active hæmorrhages, fluxes, and inflammation. A natural cure is thus often effected by the supervention of an attack of bleeding from the nostrils or from piles, or of mucous or bilious diarrhoea. The plethora is said to be *asthenic* (Gr. *a*, not; and *sthenos*, strength) when there is a deficiency of contractility and tone in the muscular fibres. In this case, the heart and vessels, instead of being excited (as in sthenic plethora) by the augmented quantity of blood, are oppressed by its load, and cannot duly expel their accumulated contents. The face is purple instead of red; the extremities cold, and the excreting organs sluggish. This form affects persons weakened by age, excesses, or previous disease. It tends to produce congestions and passive hæmorrhages, fluxes, and dropsies; and, if continued, structural changes, such as dilatation of the heart, enlarged liver, varicose veins, &c.

In *sthenic* plethora, blood-letting is the first remedy, and this, with the continued use of aperient medicine and a sparing diet, is often sufficient to complete the cure. If these means fail, recourse must be had to antimonials, salines, digitalis, and sometimes mercury or colchicum. In the *asthenic* form, Dr Williams (to whose article on 'Plethora,' in his *Principles of Medicine*, we refer our readers for further details) observes that 'the continued use of alternative aperients and diuretics, such as mild mercurials, with rhubarb, aloes, or senna, salines and taraxacum, nitric acid, iodide of potassium, &c., may prepare the way for various tonics, such as calumba, bark, and iron.' He also recommends the use of the Cheltenham, Leamington, and Llandrindod waters; first the saline, which are aperient and diuretic; and afterwards the chalybeate, which, although tonic, usually contain enough of saline matter to keep the secretions free. Food may be taken more freely than in the *sthenic* form; and in both varieties, as much exercise in the open air

should be taken as can be borne without causing exhaustion.

PLEURÆ. Each lung is invested externally by a very delicate serous membrane termed the *pleura*, which, after enclosing the whole organ, except at its root, where the great vessels enter it, is reflected upon the inner surface of the thorax or chest. That portion of the pleura which is in contact with the surface of the lung is called the

A transverse Section of the Thorax, showing the reflections of the Pleura, and the relative position of the Viscera, &c.

(From Gray's Anatomy)

- 1, The visceral and, 2, the parietal layer of the pleura, on the right side; 3, 2, the ribs; 4, 5, section of the right and left lungs; 6, the heart; 7, the pulmonary artery, dividing into the right and left branches; 8, 9, the right and left pulmonary veins; 9, 9', the ascending and descending aorta, the intervening arch being cut away; 10, 10', the right and left bronchi; 11, the œsophagus; 12, body of dorsal vertebra; 13, the sternum.

pleura pulmonalis, or visceral layer; whilst that which lines the interior of the chest is called the *pleura costalis*, or parietal layer; while the space intervening between these two layers is called the *cavity of the pleura*. Each pleura, as will be at once seen by a reference to the figure, is a closed sac, and quite independent of the other. The interspace between the pleura on the right and left side, is termed the *mediastinum*, and contains all the viscera of the thorax excepting the lungs. The inner surface of each pleura is smooth, glistening, and moistened by a serous fluid; the outer surface is closely adherent to the surface of the lung, to the roots of the pulmonary vessels as they enter the lung, to the upper surface of the diaphragm, and to the walls of the chest. The lobes of the lungs are separated from one another by involutions or in-foldings of the visceral layer; two such involutions—one on either side are shewn in the figure. The use of these serous sacs is much the same as that of the *Peritonæum* (q. v.), each pleura retains the lung and, to a certain extent, the greater vessels in position, while it at the same time facilitates, within certain limits, the movements of those parts which are essential to the due performance of the act of respiration.

PLEURISY, or inflammation of the investing membrane of the lung, is one of the most serious diseases of the chest. It is very often, but by no means invariably associated with inflammation of the substance of the lung, commonly known as *Pneumonia* (q. v.). Pleurisy without pneumonia is much more common than pneumonia without pleurisy. When both are present, but pneumonia preponderates, the correct term for the affection is *pleuro-pneumonia*, although it is frequently spoken of simply as pneumonia, probably in consequence

and by great tenderness on pressure. If it happens to be attended by slight febrile excitement, or by a cough, it is impossible to distinguish it from pleurisy, except by attending to the physical signs which characterise the latter disease. Cruveilhier maintains that 'pleurodynia is nothing more than adhesive pleurisy'; and in many cases of assumed pleurodynia, there is little doubt that the pain is due to old adhesions. The disease generally yields to local measures, such as blistering, or counter-irritation in a milder form by rubefacient liniments. A mixture of soap-liniment and chloroform rubbed over the affected part two or three times a day, often gives relief. In the more persistent cases, leeches may be applied with benefit.

PLEURONECTIDÆ, a family of fishes included in Cuvier's order *Malacopterygii*, but belonging to the order *Anacanthini* of Müller's system (see *MALACOPTERYGII*), and remarkable for a character to which there is nothing similar in any other vertebrate animals, a want of symmetry in the head, and for swimming not with the back uppermost, like other fishes, but with one side uppermost. The peculiar structure of the head adapts it to this mode of swimming, both eyes being on that side which is uppermost. Some of the bones of the head are distorted to a very considerable degree, but there is no want of symmetry in those of the body. The sides of the mouth are unequal. The body is extremely compressed, whence the P. are popularly termed *Flat Fish*, the back and belly being mere edges fringed by the dorsal and anal fins. The pectoral fins are generally unequal, also the ventral fins, those of the lower side being smaller than those of the upper. The upper side is often brown, or of some darkish colour, and variously marked; the lower side whitish. The colour of the upper side generally corresponds so much with that of the bottom, close to which these fishes swim, that they readily escape observation; and on this they seem chiefly to depend for safety, although, when hard pressed, they raise themselves in a vertical position, and suddenly throw themselves upward and forward to some distance, but then resume their ordinary posture, and as close to the bottom as possible. Their ordinary swimming is by a kind of undulating movement. They swim with great activity. They have no air-bladder. They abound chiefly where the bottom is smooth, either muddy or sandy. All of them are sea-fishes, but some are very common in brackish water, ascend rivers, and can be kept in fresh-water ponds. Many of them are in great esteem for the table. The turbot, halibut, brill, plaice, and flounder are examples of this family.

PLEURO-PNEUMONIA, in an epizootic form, first appeared amongst the horned cattle of Great Britain and Ireland in 1841. From time immemorial it had, however, been known in the great cattle-breeding plains of Central and Northern Europe. It consists in a sub-acute inflammation of the structure of the lungs and their investing membrane, shews a great tendency to early exudation, and is accompanied by low fever. It is contagious, but, like many other contagious disorders, it occasionally occurs independently of contagion, and is fostered by overcrowding, exposure to cold and wet, damp, dirty hovels, and other such causes, which depress the vital powers. The symptoms come on insidiously, appetite and rumination are irregular, there is fever, dulness, a short, half-involuntary cough, with quickened breathing and pulse. In cows, the yield of milk is early diminished. After three or four days, large portions of the lungs become filled with the products of

inflammation, hence the laboured breathing, quick indistinct pulse, wasting, and fatal weakness. Death generally occurs in from ten to twenty days. When pleuro-pneumonia first appeared in this country, it was greatly more fatal than it has since become, and fully four-fifths of the cattle attacked died; with prompt and rational treatment, more than one-half of the affected cases now recover. But as a favourable result is uncertain, and much flesh is lost even during a slight attack, it is still advisable, when pleuro-pneumonia breaks out in a herd, to consign to the shambles any of the cattle in good condition that have mixed with those diseased. The best treatment consists in avoiding bleeding and all reducing remedies, supporting the strength, and keeping up the action of the skin, bowels, and kidneys, in order that the poisonous products of the disease may be rapidly got rid of. For this end, the patient should be provided with a cool comfortable house, clothing to the body, bandages to the legs, a daily dose of two ounces each of nitre and common salt given in treacle and water. When the bowels are costive, gentle laxatives are required. By the second or third day, counter-irritants may be applied to one or both sides, which should first be bathed with hot water and thin mustard paste, or a mixture of cantharides and euphorbium ointments well rubbed in. By the third or fourth day, or earlier, if there is weakness, arrested secretion, and coldness of the skin, give several times daily some stimulant, such as a quart of warm ale, with an ounce or two of ginger or other stomachic, some good whisky-toddy, three-ounce doses of sweet spirit of nitre, or of spirit of ammonia. Whilst the disease continues, and even during early convalescence, all food requiring rumination must be interdicted, and mashies, flour and treacle, bruised grain, or any light digestible articles substituted for the ordinary hay, straw, or roots. As pleuro-pneumonia is in many cases propagated by contagion, the sick should be separated from the sound stock; and any premises they have occupied carefully cleansed by whitewashing, and the use of McDougall's, Condy's, or other effectual disinfectants. When pleuro-pneumonia prevails in a neighbourhood, all fresh purchases should be placed in quarantine, and kept perfectly away from the home-stock for at least three weeks. Attention to this simple precaution has preserved many farmers from pleuro-pneumonia, even while it has raged all around them.

PLEXIMETER. See **PERCUSSION.**

PLEYEL, IGNAZ, a musical composer of some note, born in 1757 at Rupperstahl, near Vienna. He studied music under Vanhall and Haydn, and made in early life an extensive tour in Italy, to hear the works of the best composers. In 1783, he was made *Capellmeister* of Strasburg Cathedral, and during the succeeding ten years, composed most of the works on which his popularity rests. In 1791, he visited London, and composed there three symphonies. Two years afterwards, during the frenzy of the French Revolution, he fell under suspicion, and in proof of his acquiescence in the new order of things, had to compose a musical drama for the anniversary of the 10th of August; which saved his life. After a long career in Paris as a publisher of music and pianoforte manufacturer, he retired to an estate which he had purchased near Paris, and died in 1831. His compositions, consisting of quartets, concertantes, and sonatas, are full of agreeable melodies, sometimes light and trivial, but occasionally vigorous.

PLICA POLONICA is the name given to a disease of the scalp, in which the hairs become

tragedy at the age of 13; studied eloquence under Quintilian; and became so famous for his literary accomplishments, that he acquired the reputation of being one of the most learned men of the age. His oratorical powers were also considerable; in his 19th year, he began to speak in the forum; and his services as an advocate before the court of the Centumviri and the Roman senate were in frequent request. He held numerous official appointments; served, while a young man, as *tribunus militum* in Syria, where he listened to the teaching of Euphrates the Stoic, and Artemidorus; was afterwards *quaestor Caesaris*; was praetor about 93, and consul in 100, when he wrote his *Panegyricus*, an adulatory eulogium of the Emperor Trajan, and containing little information as to the author and his times. He was appointed, in 103, praetor of the province Pontica, an office which he vacated in less than two years; and he also discharged the function of curator of the banks and channel of the Tiber. He was twice married, his second wife being Calpurnia, grand-daughter of Calpurnius Fabatus, and considerably younger than her husband, by whom she was much beloved for her accomplishments and amiability. He had no issue by either marriage.

Our knowledge of P. the Younger is mainly derived from his letters or *Epistolae*, of which there are ten books. He collected them himself, and probably wrote many of them with a view to publication. They hold a high place in epistolary literature, and give us many interesting glimpses into the life of their author and his contemporaries. P. himself appears in them to considerable advantage, as a genial and philanthropic man, enamoured of literary studies, and fond of improving his estates by architectural ornament. His ample fortune was liberally bestowed; and his slaves always found in him an indulgent master. Infirm health impaired throughout life his constitution, which was naturally weak; but of the time or cause of his death, we know nothing. Of the facts contained in his letters, however, the most interesting to us are those relating to the punishment of the Christians. Death appears to have been the penalty attached even to the confession of being a Christian; although the adherents of the faith admitted no other acts, on examination, than those of meeting on a fixed day before dawn, when a hymn to Christ was sung, and taking an oath to avoid theft, adultery, breach of faith, and denial of a deposit. Nothing more unfavourable to them than this could be extorted by P. from two female slaves, reputed to be deaconesses, whom he put to the torture. P. having asked Trajan how he was to stop the spreading superstition, the emperor replied that no general rule could be laid down; that he ought not to institute a search after persons supposed to be Christians; but if any were brought before him, and the charge was proved, such were to be punished, if still impenitent. The best edition of P.'s *Panegyricus* and *Epistolae* together, is that of Schaefer; of the *Epistolae* alone, that of Gierig.

PLOCARIA, a genus of *Algae*, of the order or suborder *Ceramiales*, having a cartilaginous frond, composed of large cells, as if jointed, and dividing into slender, tufted, and densely aggregated branches. *P. helminthochorton* is the CORSIKAN MOSS of the apothecaries' shops, once of some reputation as a vermifuge, but now little used, and believed to be of little efficacy. It is a small plant, with a filiform entangled frond, and grows on the shores of the Mediterranean. It has a strong marine odour and a salt taste. It consists in great part of a vegetable jelly or mucilage, which renders it nutritious, and contains much chloride of sodium, sulphate of lime, and carbonate of lime. As sold in the shops,

it is always much mixed with other algae.—*P. tenax* is a small plant with filiform, branched, and somewhat gelatinous frond, much used by the Chinese as a glue. It is also used in China as an article of food.—*P. candida* is used to a considerable extent as an article of food in the East. It is popularly called Ceylon Moss. The frond is whitish and much branched, the branches long and somewhat clustered. It is exported to China from the islands of the Indian Archipelago, forming a portion of the cargo of almost every junk. The Chinese make it into a jelly with sugar, and use it as a sweetmeat. It consists in great part of a vegetable jelly, with a considerable quantity of starch. It has been introduced into Britain as a light and nourishing food for children and invalids, and is found particularly suitable in cases of irritation of the mucous surfaces.

PLOCEUS. See WEAVER BIRD.

PLOCK (Russ. Plotzk), a town of Poland, capital of the government of the same name, occupies an elevation on the right bank of the river Vistula, 78 miles west-north-west of Warsaw. Its principal buildings are the cathedral, built in 961, the bishop's palace, theatre, &c. Agriculture, and the export of grain to Danzig and other ports, are the chief employments. Pop. 10,604.

PLOCK (Russ. Plotzk), a government in the north of Poland, bounded on the north by Prussia, and on the south-west by Warsaw. Area, 6600 square miles; pop. 561,903, 80 per cent. of whom are Poles. Hills occur in the north and on the banks of the Narew and Vistula, which with the Bug are the chief rivers. One-third of the surface is covered with forests, and there are many marshes and lakes. The inhabitants are engaged chiefly in agriculture, and in cattle and sheep breeding.

PLONGÉE, in Artillery and Fortification, means a slope towards the front. Thus, in speaking of the course of a shell through the air, its plongée is from the point of greatest altitude to the point at which it strikes the earth. So, in fortification, the plongée is the top of the parapet sloping gently towards the front. This slope is ordinarily 1 in 6; but a deviation is permissible of from 1 in 9 to 1 in 4: the sharper the slope, however, the more liable is the crest of the parapet to be destroyed by an enemy's fire. Moreover, as flat a plongée as possible is desirable, that sandbags may, when required, be laid upon it to form a cover for riflemen. See FORTIFICATION, fig. 7.

PLOTINUS, the most original and important philosopher of the Neo-Platonic School, was born at Lycopolis in Egypt 205 A.D.; but such was his utter indifference to things human, 'being ashamed almost to live in a body,' that he never would divulge even his parentage. He would never allow his birthday to be celebrated, although he gave feasts on those of Socrates and Plato; nor would he ever permit a painter or sculptor to perpetuate his features, or, as he called it, to produce the image of an image—the body being to him only a faint image of existence. He deemed it tedious enough already to have to drag about this image whithersoever he went in this life. His body was altogether contemptible in his eyes; he would see no physician in his illness, and was very sparing in the use of food, refraining from meat, often even from bread. Strangely enough, his desire for the study of philosophy did not arise within him before his 28th year, when he repaired to Alexandria, and there, after having sat at the feet of the great masters for some time without feeling satisfied with their teachings, he at last became acquainted with Ammonius Saccas, and in him found the desired teacher. For ten years he

PLOUGH, PLOUGHING.

handles, one of which, *BL*, is a continuation of the beam, the other, *M*, being fastened partly to the former by rods, and partly to the lower portion of

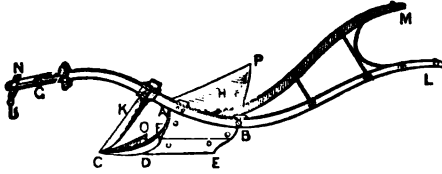


Fig. 1.

the framework (fig. 2, which also shews the point of the plough with the share removed), are for the purpose of guiding the implement. The front

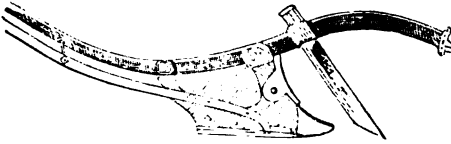


Fig. 2.

part of the beam is formed with an upward curve; at its extremity, is placed the *bridle*, *N*, to which the horses are attached by means of swing-trees and chains or traces, and the object of which is to enable the workman to elevate or depress the line of draught, or move it to the right hand or the left, as may be found necessary. The left sides of the coulter, share, and framework *ADEB*, should evidently be in the same vertical plane. The form of the mould-board is of the utmost importance, and has chiefly attracted the attention of agricultural machinists since the time when improvements on the plough were first projected. Its office being to raise and turn the sod, it is necessary that the surface should slope upwards and outwards from the front, so as to apply a pressure in both directions, and, accordingly, the surface is so shaped that from the point of the share, where it is horizontal, it gradually curves upwards, till, at the extremity, *P*, it inclines over away from the body of the plough. The gradual change produced on the position of the furrow-slice is seen in fig. 3, where *ABCD* on the left-hand side,

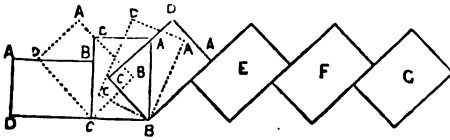


Fig. 3.

represents the slice untouched by the plough, *AD* being the line of section by the coulter; *DC*, by the share; *BC*, the open side from which the previous furrow (*E*) to the right-hand side has been separated; and the four successive rectangles, *ABCD* to the right, illustrate the successive changes of position of the furrow as the mould-board is pushed forward under and on its left side, till it is finally left, as represented in *ABCD* on the right hand; *E, F, G* are furrows which have previously been laid in their proper position. The advantages of laying the furrows in the position shewn are these: in the first place, the weedy side of each furrow being closely applied to the previous furrow, and kept pressed against it by

its own weight, the weeds are completely buried; secondly, the ridged surface thus presented, affords the means of covering the seed by harrowing; and lastly, the openings below increase the amount of surface accessible to air, and drain off superfluous water. The plough is wholly formed of iron; the share and the framework of malleable, and the mould-board of cast iron; while the coulter is frequently welded with steel on the right-hand side, the better to resist attrition. In most of the English (as distinguished from the Scotch) ploughs, wheels are attached at or near the front end of the beam, a contrivance which renders the implement more steady in its motion, more easily managed, and capable of doing better work in the hands of an inferior workman; but it is generally believed, in Scotland at least, that the plough without wheels, or *swing-plough*, as it is technically termed, is greatly more efficient in the hands of a thoroughly skilled ploughman. The usual dimensions of the furrow-slice in lea or hay-stubble are 8 or 9 inches in breadth by 6 in depth; and in land for green crop, 10 inches in breadth, and 7 or 8 in depth; though shallower ploughing is not unfrequently adopted, especially on thin soils.

Other kinds of ploughs are used for special purposes, such as *trench-ploughs*, which are made on the same principle as the common plough, but larger and stronger, so as to bring up a portion of the subsoil to the surface; *subsoil ploughs*, which have no mould-board, and merely stir and break up the subsoil, thus facilitating drainage; *double mould-board ploughs*, which are merely common ploughs with a mould-board on each side, and are employed for water-furrowing, or for earthing up potatoes, &c. Of each of these ploughs, there are many varieties, each maker having generally some peculiar views regarding the form and proportion of some parts or the whole of the instrument, and this is specially the case at the present time, when competition between makers has become so active. For those who wish to study minutely the best form of plough, it will be necessary to consult works on agriculture and agricultural implements. There is, however, one very peculiar form of plough much used in various parts of England, which deserves more particular notice; this is the *turn-uread plough*. Its chief peculiarity is, that instead of one, it has two mould-boards, one on each side, and these are alternately brought into operation, so that the furrow is always turned over in the same direction. The mould-boards are firmly fastened together in front, and kept at a constant distance from each other behind, by means of struts, while the handles are movable with reference to them; the mould-board which is intended to be used being pushed away from, and the other (which for the time does the same work as the vertical surface *ADEB* in fig. 1) brought nearer to the line of the beam; of course, when the next furrow is ploughed, the mould-boards exchange adjustments. This form of plough is very useful in

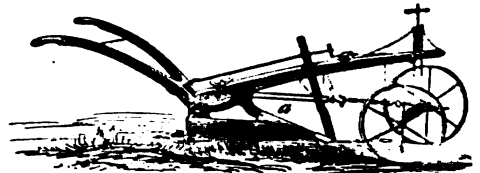


Fig. 4.

ploughing along a hillside, as by it all the furrows can be turned over towards the hill, thus preventing the natural tendency of the soil to work itself

PLOUGH, PLOUGHING.

by the pressure of the foot of another man who directed it. Britain and America, and their colonies, are the only countries in which the plough has been

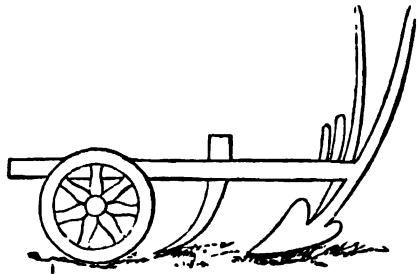


Fig. 8.

brought to a state worthy of being considered effective, and even in Britain the most important amendments on it are not two centuries old. England took the lead in improvement by rendering the form more neat and effective, and by attaching wheels to aid in keeping the plough in a proper upright position. In Scotland, for some time after this, the plough was extremely rude and cumbrous, and usually drawn by 8 oxen; but in the middle of the 18th c., some Dutch ploughs were imported, and being found more effective, an impetus was thus given to attempts at improvement. James Small, who may justly be regarded as the real inventor of the Scotch or swing-plough, made great and important changes in the form and efficiency of the coulter, share, and mould-board, producing an implement at once lighter and vastly more efficient. All the swing-ploughs of successive makers are founded upon the basis of Small's plough. Wilkie of Uddingston (Lanarkshire) formed it wholly of iron, and his modification has been universally adopted in the modern ploughs. Among the various improvers of this form of cultivator may be mentioned, besides Wilkie of Uddingston, Gray of the same place, Clarke of Stirling, Cunningham, Barrowman, Ponton, Sellars, &c. In England, swing-ploughs are occasionally met with, but the wheel-plough is the one generally used; like its Scotch neighbour it had many defects, which have been gradually remedied, chiefly by Ransomes of Ipswich (the patentee in 1785 of the cast-iron share), Howard of Bedford, Hornsby of Grantham (Lincolnshire), and Busby of Bedale, the last of whom gained a medal for his mould-boards at the Great Exhibition of 1851. The English and Scotch ploughs differ from each other in many important particulars, especially in the form of the mould-boards and in the adjustment of the coulter, the first being chiefly adapted for shallow, and the latter for deep, ploughing. In the Cotswold district, a plough constructed of wood, and with a wooden mould-board (the *Beverstone Plough*), is in general use, and is found sufficiently well adapted for the shallow ploughing there practised. For further information concerning the plough and the mode of using it, see Morton's *Cyclopædia of Agriculture* (1856), Stephens' *Book of the Farm*, *Book of Farm Implements*, by Henry Stephens and R. Scott Burn, and other works.

Steam-ploughing.—Although it is not yet ten years since cultivation of the land by steam came into successful operation, it is about two centuries and a half ago since it was foreseen to be possible. So long ago as 1618, David Ramsey and Thomas Wildgosse took out letters-patent for engines and machinery to plough the ground without the aid of oxen or horses; and nine years

afterwards, other ingenious men obtained letters-patent for machines to affect a similar purpose. It is the opinion of Mr Woodcroft of the Patent Office, who compiled the *Abridgments of the Specifications Relating to Steam-culture*, that steam was the motive power intended to be employed; but as the first patent was taken out nearly 40 years before the Marquis of Worcester described the steam-engines in his *Century of Inventions*, the grounds for such an opinion do not seem quite satisfactory. In 1769, however, after the steam-engine had been applied to other purposes, there was lodged in the Patent Office a specification for a new machine or engine, to plough, harrow, and do every other branch of husbandry, without the aid of horses. The patentee was Francis Moore; and so confident was he of the merits of his plan, that he sold all his own horses, and persuaded his friends to do the same; 'because the price of that noble and useful animal will be so affected by the new invention, that its value will not be one-fourth of what it is at present.' Moore, however, was much too sanguine; his method of cultivating the land without the aid of animal power failed, as those of others before him had done.

The next invention that it is here necessary to mention was one by Major Pratt, patented in 1810. His plan was to have two engines, one on each headland, drawing, by means of an endless rope, an implement between them. In order to save the labour and loss of time in turning the plough at the ends, he attached two ploughs, back to back, making them work upon a fulcrum in the centre of a frame, so that one could be raised out of the ground when the other was working. This was the first adoption of the balance-principle, now employed in most implements used in steam-cultivation. Major Pratt's apparatus, like those of his predecessors, never came into practical operation.

In the interval between 1810 and 1832, when Mr Heathcoat, M.P., a Tiverton lace-merchant, patented the first steam-ploughing machinery that ever wrought successfully in the field, there were many inventions, but these being of little utility, need not be particularised. Mr Heathcoat's machinery was principally intended for draining and breaking up soft or swampy land. It consisted of a locomotive steam-engine, with a broad, endless, flexible floor or railway attached to the wheels, so as to prevent them from sinking in the boggy soil. Opposite to this engine, an auxiliary carriage was placed, and between the two the plough was drawn backwards and forwards by an endless chain or band—engine and carriage moving along as the work proceeded. In 1836, this plough worked with tolerable success in Red Moss in Lancashire, and in 1837 it was tried near Dumfries, under the auspices of the Highland and Agricultural Society of Scotland; but here its performance, though in some degree satisfactory, was not sufficiently so to warrant the judges in awarding to it the prize of £500, which had been offered for the first successful application of steam-power to the cultivation of the soil by the Society. The apparatus was very cumbersome and expensive to work, the engine being 25 horse-power, and the number of men and boys employed in the operation no less than ten. The amount of work done was at the rate of 8½ acres per day. Mr Heathcoat abandoned the machine after having spent about £12,000 on it.

After Mr Heathcoat, the inventors specially worthy of mention are Alexander M'Rae, who, arranging his motive-power in the same manner as Major Pratt, made the important addition of a barrel to the plough-frame upon which the slack-rope was to be wound up; Mr Hannam of Burcote, who, in 1849, designed an apparatus to be driven

PLOUGH, PLOUGHING.

land they take such hold as effectually to resist the pull of the rope which is passed round the sheave beneath. The anchor has a self-acting motion—the power being communicated from the engine through the medium of the ploughing-rope—which enables it to move along the headland, and

Fig. 10.—The Anchor.

keep opposite to the engine. The plough (fig. 11) is a framework of iron, balanced upon two large wheels. To each side of this framework there are attached four plough-bodies and coulters, so that four furrows are cut at one 'bout,' and the headland on which the anchor is stationed being reached, the end of the beam that was out of the ground is depressed (the other, of course, being raised), and the four plough-bodies that were out of the ground, and which point in the opposite direction, are inserted in the soil, and turn up the furrows on the way back to the engine. By altering the position of the plough-bodies along the frame-work, a broad or a narrow furrow can be cut at pleasure. In ordinary working, an acre an hour is accomplished. The wire-rope, by which the plough is dragged through the land, passes round the sheaves on the anchor and the engine, the ends are attached to two drums upon the plough; and by a nice mechanical arrangement, the ploughman who rides

Fig. 11.—Fowler's Plough.

upon the implement is enabled to wind up, or let out slack if necessary, without loss of time. The wire-rope is made in lengths, which are easily disjoined, in order that it may be adjusted to irregularly shaped fields, or rather to fields that are not exact squares or parallelograms; for Fowler's method is not well adapted to such irregularities as prevent the engine and anchor being opposite each other. The rope is borne off the ground—a very necessary precaution, without which the wear and tear would be alike annoying and expensive—by a number of pulleys, or 'rope-porters' as they are called, mounted on frames. The outside ones, that is, those farthest from the work, are moved along by the action of the rope; those in front of the plough are removed by boys, and placed behind the implement as it proceeds. The *modus operandi* will be patent at a glance, from the annexed plan of

Fig. 12.—Fowler's Anchor, Engine, and Plough at work.

working (fig. 12). To manage this apparatus three men and two boys are required—namely, a man at the engine, another on the plough, a third at the anchor, and the lads to look after the rope-porters. The water and coals needed for the engine must be brought by other men.

The plough-bodies can be removed from the frame, and in their place 'digging-breasts' be attached, by means of which the land is thrown up in a somewhat similar manner to that in which it is turned over by the spade. The price of the ploughing and cultivating apparatus is as follows: 14-horse

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power double-cylinder engine, with self-moving and reversing gear, with tank, steering, 20-inch wheels, clip-drum, 150 yards headland rope, snatch-block, spade, tools, and tool-box, complete for steam-cultivation, £614; self-moving anchor, with six discs, lifting jack, headland ropes, and all tools complete, £55; four-furrow balance-plough, fitted with slack gear, digging and scarifying breasts, £97; 800 yards best steel rope, fitted with eyes and joints, £84; 10 large, and 10 small, rope porters, £25. Total, £975. Of course, in the case of an engine of less horse-power being required, the price is proportionately lower. At the Newcastle show of the Royal Agricultural Society, in July 1864, Mr Fowler introduced two engines of 7-horse power, working simultaneously on opposing headlands. The expedition with which these engines were set down to and completed their work was a matter of admiration to all present, and the subject of special remark by the judges. These gentlemen say: 'The engines worked smoothly; and so far as we could ascertain, appeared to bear an equal share of work in either direction.' They got up steam in nearly half an hour less time than the 14-horse engine, and working with them, much less time was required to arrange the tackle. 'The engines were masters of their work; and acting in combination, appeared to

possess more power than the large engine and anchor. . . . The advantages of this system appear to be, that horses are not required to move tackle; that there is a saving of time in setting down, taking up, and removing from field to field [no unimportant consideration]; and that the two small engines are both available for ordinary farm-work, such as thrashing, driving, barn-work, &c.' The cost of the two engines, with their apparatus, is £1066. The number of hands employed is the same as at the large anchor and engine; but as a skilled labourer is necessary where only an unskilled labourer is needed in the latter case, the cost per day is 2s. more; working the large engine and anchor, including the cartage of water and oil, is estimated at 16s. per day; the two engines at 18s. Fowler has been most successful in carrying off the prizes at all the competitions of steam-ploughs, having received in this way, since 1856, nearly £3200, besides gold medals.

Howard's system consists in a stationary engine driving a windlass, having two winding drums, with direct and reverse action, placed in front of it, round which is coiled about 1600 yards of wire-rope. By a simple lever movement, the man can drop the winding drums out of gear in an instant, a contrivance which enables him to attend to the proper

Fig. 13.—Howard's General Plan.

coiling of the rope, and also to arrest, in case of accident, the plough in a moment, without stopping the engine. The engine is usually placed at the corner of the plot to be ploughed, the rope is carried round the field on rope-porters, and fixed at the corners by light anchors. A snatch-block placed in front of the windlass prevents the slack-rope running out too fast, and trailing on the ground. The plan of working given clearly illustrates the arrangement (fig. 13). The plough, as will be seen from fig. 14, is composed of two strong iron frames balanced upon four wheels, and crossing each other at their inner ends, thereby decreasing the length of the plough, and, as a matter of course, the

Fig. 14.—Howard's Plough.

breadth of the headland. The frames are raised and lowered in such a manner that the set of the furrows out of work is independent of, and has no tendency to weigh or raise out of the ground the set in work. The frames are made for two, three, or four furrows, and 'diggers' or scarifiers can be

PLOUGHGATE OF LAND—PLOVER.

attached the same as in Fowler's. It should be mentioned that the Messrs Howard prefer the cultivator, that is, a machine to smash up the land rather than the plough, and the plough is not included in the cost given below. In this method the plough is not pulled direct between engine and anchors, but at right angles to the engine—between one anchor and another, the anchors being removed inwards by manual power, and nearer the engine every time the field is traversed by the plough. With this system there are five men and two boys required; viz., a man at the engine, another at the windlass, a third on the plough, two at the anchors, and the boys to look after the rope-porters. The cost of this apparatus—which, exclusive of engine, consists of the patent windlass, 1600 yards of patent steel wire-rope, universal joint, for connecting the windlass with engine, patent double-action steam-cultivator, with five tines, patent double snatch-block, with arrangement for slack-rope, anchors, single snatch-blocks, rope-porters, &c.—is £250; and a 10-horse portable engine is £295; making the whole £545. The cost of working this apparatus, including water-cart, and boy, and oil, is 20s. 6d. per day.

In Coleman's system, the drums upon which the rope is wound are attached to the sides of the engine, and give out and take on rope alternately. The engine moves along the headland; and the anchor, upon which there is very little strain, and which is, therefore, a very light, portable article, is shifted opposite to it by a man as the work is performed; direct action being obtained here, as in the case of Fowler's. The peculiarity of the plan consists in having two implements instead of one at work, the implements being grubbers, which smash up the ground—a practice now adopted by some farmers in England, in preference to turning the sod over with the plough. On commencing operations on this plan, the field is divided into two equal parts. The cultivators or grubbers work only one way—towards the engine. They are attached by the front to each end of a strong wire-rope, while a smaller wire-rope is fastened to their rear. The one cultivator is placed at the far side of the field, where its teeth or 'tines' are inserted in the ground; and it is pulled towards the centre of the field, tearing up the soil as it comes, the other meanwhile going out empty to meet it. When the latter reaches the middle of the field, the action of the engine is reversed, and it is dragged back to the engine, cultivating the land as it travels, while the other goes back to the headland empty. The pull out empty and working in is, of course, continued until the whole land has been tilled.

The other systems before the public are in principle the same as those described, though they are variously modified in detail.

With regard to the merits of each, it may be stated as the general opinion that Fowler's is the best for large fields. Moving along the headland, and propelling its anchor along with it, this apparatus could cultivate a field of from 350 to 400 yards in breadth, and of any length, without requiring to be shifted. Its direct action also secures that there is as little waste of power as possible. The advantages of saving time and conserving force, which these two features secure, can hardly be over-rated.

Howard's system seems to be regarded as most desirable where fields are small and irregularly shaped, as the rope can be so disposed as to enable the cultivating implement to reach almost any angle. The engine may be so placed that 40 or 50 acres may be cultivated without moving it; but the anchors, pulleys, rope-porters, &c., must be

shifted after the completion of every ten or twelve acres, and thus a considerable time is lost. There must also be some little waste of force in dragging so much rope and the implement at right angles to the engine. By this method, however, a trifling saving of water-carriage could be effected as compared with Fowler's, by having tanks at the engine-stations.

With Coleman's method, there is a little time saved at the ends in comparison with the other two, and there is also some economy in the purchase of the rope; but then there is loss of power in pulling an empty implement half through the field, and a necessary wear and tear of rope in dispensing with rope-porters, and allowing the wire to trail upon the ground.

By all the apparatus, however, tillage is much more perfectly and even cheaply performed than by horse-labour. As a rule, about three-fourths of an acre to an hour can be cultivated with either Fowler or Howard's apparatus. Where soil and climate are so variable as they are in Great Britain, it would serve no good purpose, but would be rather misleading, to name a price per acre at which steam-ploughing can be effected; but the following general statements in its favour may safely be made. That the use of the steam-plough or cultivator enables the farmer to perform his tillage operations at the best season of the year, and to free his land more quickly and effectually from weeds. Tenacious soils are rendered more friable and porous, and good drainage promoted by the efficient manner in which the subsoil can be stirred by the aid of steam. The steam-cultivator, plough, or harrows, may be frequently worked to advantage in an unfavourable season, when it would be impossible to work with horses. And not only a considerable diminution in the number of horses employed can be effected, but the horses, which are still necessary, can be kept at less expense. Consequently cultivation by steam-power, besides being more excellent, is actually cheaper, monetarily considered, than that done by horses.

There are at present about 800 or 900 steam-ploughs at work in Great Britain, and the demand for them is yearly increasing. Mr Fowler is now turning out of his Leeds' establishment about six engines with their appurtenances per week; and the Messrs Howard have also large demands. Many are exported to the continent, to the West Indies, to Egypt, and the East Indies.

PLOUGHGATE OF LAND, in the Law of Scotland, is an expression denoting a quantity of land of the extent of 100 acres Scots. No person is qualified to kill game in Scotland who has not a ploughgate of land, and this is still the law. Paterson's *Game-laws of United Kingdom*, p. 158.

PLOVER (*Charadrius*), a genus of birds of the family *Charadriidae* (q. v.), having a straight compressed bill; the upper mandible alone slightly inflated and slightly bent at the point; the nasal groove extending about two-thirds of the length of the bill, the nostrils longitudinally cleft near the base; the legs not very long, naked a little above the tarsal joint; no hinder toe; the wings rather long and pointed, the first quill-feather the longest. The species are numerous, and are found in every quarter of the globe; many of them are birds of passage. They chiefly frequent low moist grounds, where they congregate in large flocks, and feed on worms, molluscs, insects, &c.; but some of them visit mountainous regions in the breeding-season. They fly with great strength and rapidity, and run with much swiftness. The flesh and eggs of many of them are esteemed delicacies. One of the British

PLUM—PLUMULARIA.

of the varieties attain a height of more than 20 feet, with a moderately spreading head. The fruit is mostly produced on spurs; but some of the finest fruit on the shoots of the former year. Among the varieties of *P.* are some which ripen their fruit early, and others which ripen late in the season. The blossom of some of the finer kinds is often protected by gardeners, like that of peaches and apricots. The wood of the *P.*-tree is hard and fine-grained, and is used in cabinet-work, in turnery, and for making musical instruments. The CASHMERE *P.* (*P. Bokharensis*), cultivated in Cashmere and Bokhara, is regarded as a distinct species. The CHERRY *P.*, or MYROBALAN *P.* (*P. cerasifera* or *Myrobalanus*), is a bush very similar to the sloe, with pendulous globular red fruit. It is a native of North America, but is often cultivated for its fruit on the continent of Europe. In Britain, it seldom produces fruit. *P. maritima* is a shrub, indigenous to sandy soils on the sea-coast of North America from New Jersey to Carolina. It has a dark purple agreeable fruit, about the size of a pigeon's egg.

The Cocoa *P.* or ICACO of the West Indies is the fruit of *Chrysobalanus icaco*, a tree of the natural order Rosaceæ, suborder *Chrysobalanææ*. The fruit resembles a *P.*, has a sweet although slightly austere taste, and is eaten both raw and preserved. The fruit of *Parinarium excelsum*, another of the *Chrysobalanææ*, is called Gray Plum at Sierra Leone.

PLUM, DATE. See DATE PLUM.

PLUMAGE OF BIRDS. See BIRDS and FEATHERS.

PLUMATE'LLA, a genus of zoophytes (*Polysoa*), having the polypidom fixed, membranaceous, conserva-like, and branched; the polypes issuing from



Plumatella Repens.

(From Johnston's *British Zoophytes*.)

the extremities of the branches, with a crescent-shaped disc surrounded by a single series of many tentacles. The species are found in fresh water, attached to stones, &c. *P. repens* is a common British species, sometimes spreading over a square foot, and having branches three inches long, which adhere to some surface throughout almost their whole length. The tentacles are beautifully feathered with cilia on two opposite sides.

PLUMBAGINÆÆ, or PLUMBAGINACEÆ, a natural order of exogenous plants, herbaceous or half-shrubby; with leaves somewhat sheathing at the base, and often clustered; flowers in panicles or in heads; calyx tubular, persistent, plaited; corolla very thin, of one or five petals; stamens five; ovary superior, 1-celled, with a solitary ovule; styles generally five; fruit a Utricle (q. v.). There are about 160 known species, chiefly found on the sea-shores and in the salt marshes of temperate

regions. Some are found also in elevated regions, in all zones. Many have flowers of great beauty, and are therefore favourites in gardens. Some are occasionally used in medicine as tonics and astringents; others, being exceedingly acrid, as vesicants, particularly species of *Plumbago*. Thrift, or Sea-pink (q. v.), is the most familiar British example of the order.

PLUMBA'GO. See BLACK LEAD.

PLUMED MOTH, the popular name of a group of 'Nocturnal Lepidoptera,' known to entomologists as *Fissipennæ* and *Pterophorites*; remarkable for having at least a pair of the wings, and often all the wings, longitudinally cleft into two or more—sometimes six—divisions, which are beautifully fringed at the edges. The wings are similar to those of other moths in their nervures, but the membrane

Plumed Moth.

which usually connects the nervures is interrupted. The Plumed Moths are extremely beautiful, but often pass unobserved in consequence of their small size. Some of them have the power of folding up the wing like a fan. Although they are ranked among the *Nocturnal Lepidoptera*, some of them fly about during the brightest part of the day.

PLUMMET, a weight or lead hung on a string, and attached to a frame, for the purpose of shewing the vertical line.

PLUMULARIA, a genus of zoophytes (*Anthozoa*); plant-like, rooted, simple, or branched; with feathery shoots and offsets; and having hydrant-like polypes in small cells arranged on one side of

Plumularia Falcata (natural size):

a, the ovarian vesicle and four of the polype-cells of *P. falcata*, magnified. (From Johnston's *British Zoophytes*.)

the shoot or branch, usually in the axil of a horny spine. The species are numerous, inhabitants of the sea, some of them very common on the British coasts,

following: 1. Theseus and Romulus; 2. Lyncurgus and Numa; 3. Solon and Valerius Publicola; 4. Themistocles and Camillus; 5. Pericles and Q. Fabius Maximus; 6. Alcibiades and Coriolanus; 7. Timoleon and Æmilius Paulus; 8. Pelopidas and Marcellus; 9. Aristides and Cato the Elder; 10. Philopœmen and Flamininus; 11. Pyrrhus and Marius; 12. Lysander and Sulla; 13. Cimon and Lucullus; 14. Nicias and Crassus; 15. Eumenes and Sertorius; 16. Agesilaus and Pompeius; 17. Alexander and Cæsar; 18. Phocion and Cato the Younger; 19. Agis and Cleomenes, and Tiberius and Caius Gracchus; 20. Demosthenes and Cicero; 21. Demetrius Poliorcetes and M. Antonius; 22. Dion and M. Junius Brutus. In addition to these are placed in the editions after the 46th *Parallel Lives*, the biographies of Artaxerxes Mnemon, Aratus, Galba, and Otho. P. has no equal in ancient, and few in modern times, as a writer of 'Lives.' His power lies in his felicitous grasp of the character as a whole, and his skill in keeping minor details in subordination. It is not till the reader has seen the portrait in its completeness that his attention is attracted to accessory points. 'There are biographers (says an admirable writer in the *Quarterly Review*) who deal with the hero, and biographers who deal with the man. But Plutarch is the representative of ideal biography, for he delineates both in one.' Yet with all their artistic harmony, his lives abound with anecdotes and *bon-mots* in such profusion, that they form one of our chief authorities for the table-talk of the Greeks and Romans. Their popularity in ancient, mediæval, and modern times, with readers of every rank and age, is something extraordinary, and they have in consequence exerted a very powerful and a very salutary influence on the art of biography, as subsequently practised. The other writings of P., more than 60 in number, are included under the general title of *Moralia*, or Ethical Works. Several of these are not purely ethical in their tenor; while many of them are probably not by him, or if they are, do him small credit. Even in the best of the *Moralia*, there is no philosophical system to be found; their merits are not speculative, but practical; and their value consists mainly in their good sense, in the justness of their views on the ordinary affairs of human life; and in the benevolence of tone diffused throughout them. The best text of the *Lives* is that of Immanuel Bekker; the best translation in English is that of Dryden and others, as re-edited by Clough. The best edition of the *Moralia* is by Wytenbach (Oxford, 1795—1800); and of the entire works, the editions of Reiske (Leip. 1774—1782) and Hutten (Tübingen, 1791—1805).

PLUTEUS, in Classical Architecture, a wall filling up the space between two columns. Also the space between two orders, placed over one another, as in the amphitheatres, &c.

PLUTO (Gr. *Ploutôn*, from *Plouteo*, to be rich), originally only a surname of HADES, as the giver or possessor of riches, is, in the Mythology of Greece, the third son of Kronos and Rhea, and the brother of Zeus and Poseidon. On the tripartite division of the universe, he obtained the sovereignty of the under-world—the realm of darkness and ghostly shades, where he sits enthroned as a 'subterranean Zeus'—to use the expression of Homer, and rules the spirits of the dead. His dwelling-place, however, is not far from the surface of the earth. P. is inexorable in disposition, not to be moved either by prayers or flatteries. He is borne on a car, drawn by four black steeds, whom he guides with golden reins. His helmet makes him invisible, whence, according to some scholars,

his name of *Hades* (from *a*, priv., and *idein*, to see); although others, with at least equal probability, derive Hades from *hado* or *chado*, to receive or embrace, and translate the word the 'all-receiver.' In Homer, Hades never means a place, but always a person. Moreover, it is to be noticed that the poet does not divide the realm of the shades into two separate regions. All the souls of the dead—good and bad alike—mingle together. Subsequently, however, when the ethical conception of future retribution became more widely developed, the kingdom of the dead was divided into Elysiun (q. v.), the abode of the good, and Tartarus (q. v.), the place of the wicked. This change also exercised an important influence on the conception of Pluto. The ruler of the under-world not only acquired additional power and majesty, but the very idea of his character was essentially modified. He was now regarded as a beneficent deity, who held the keys of the earth in his hand, and possessed its metallic treasures (whence his new name *Pluto* or *Plutus*), and who blessed the year with fruits, for out of the darkness underground come all the riches and swelling fulness of the soil. Hence, in later times, mortals prayed to him before proceeding to dig for the wealth hidden in the bowels of the earth.

P. married Persephone (Proserpina), the daughter of Demeter (Ceres), after carrying her off from the plains of Enna. He assisted his brothers—according to the mythological story—in their war against the Titans, and received from the Cyclops, as a reward for delivering them from Tartarus, the helmet that makes him invisible, which he lent to Hermes (Mercury) in the aforesaid war, to Perseus in his combat with the Gorgons, and which ultimately came to Meriones. The Erinyes and Charon obey his behests. He sits in judgment on every open and secret act, and is assisted by three subordinate judges, Æacus, Minos, and Rhadamanthus. The worship of P. was widely spread both among the Greeks and Romans. Temples were erected to his honour at Athens, Elis, and Olympia. Among trees and flowers, the cypress, boxwood, narcissus, and maidenhair were sacred to him; bulls and goats were also sacrificed to him amid the shadows of night, and his priests had their brows garlanded with cypress wreaths. In works of art, he resembles his brothers Zeus and Poseidon; only his hair hangs down somewhat wildly and fiercely over his brow, and his appearance, though majestic, as becomes so mighty a god, has something gloomy and terrible about it. There can be little doubt that he, as well as Pan (q. v.), helped to trick out the conception of the devil prevalent during the middle ages, and not yet extinct. If it was from Pan that the devil derived those physical characteristics alluded to in the famous *Address to the Devil* by the poet Burns:

O thou, whatever title suit thee,
An'd *Hornie*, Satan, Nick, or *Gloutie*,

it is no less certain that it is to P. he owes his position as 'king of Hell,' 'his Blackness,' and many of the insignia of his infernal royalty.

PLUTO'NIC ROCKS, the name given by Lyell to the Granitic Rocks, from the supposition that they were formed at considerable depth in the earth, and were cooled and crystallised slowly under great pressure. They were so designated in contradistinction to the Volcanic Rocks, which, though they have risen up from below, have cooled from a melted state more rapidly upon or near the surface. See GRANITE.

PLYMOUTH, an English seaport and market town, and a parliamentary and municipal borough

'prophecy' or pre-ach; and in their meetings, after each hymn or prayer, there is usually a pause, that any one, moved by the Spirit, may undertake this office. They exclude persons known to have been guilty of gross sins from participation with them in the Lord's Supper, until proof is afforded of repentance. The P. B. reject every distinctive appellation but that of Christians; although a special denomination is found necessary to designate them; and, in fact, no one not holding their views could remain associated with them. A great schism took place among them in consequence of doctrines preached at Plymouth and Bristol concerning the human nature of Christ; Mr Darby vigorously opposing what he deemed a dangerous error, and he and his adherents utterly separating from the fellowship of those who maintained or even refused to condemn it. One of the most noted (if not notable) converts to the principles of the sect was the revivalist Guinness, who was baptised in 1860 by another Plymouth brother, Lord Congleton.

On the continent of Europe, the P. B. have in many places given great trouble to the Protestant churches, by their opposition to all ecclesiastical order or organisation. See Mrs H. Grattan Guinness's *Answer to the Question: Who are the Plymouth Brethren?* (Philadelphia, 1861).

PLYMOUTH SOUND, a well-known roadstead on the south-west of Devonshire, important as a naval station, has considerable claims to the distinction of being called, as it frequently has been, the most beautiful estuary on the English coast. Its position at the entrance of the English Channel is much in its favour. It is two and a half miles wide, and extends inland for three miles. It penetrates into the country by means of the harbours of Hamoaze and Catwater, the estuaries of the Tamar and Plym respectively. On its west side is Cawsand Bay. The shores, which present many beautiful views, rise in hills of from 100 to 400 feet, and are dotted over with woods and with villages, and bound by coasts which are generally rocky and abrupt. Mount Edgecombe Park, the beautiful seat of the Earl of Mount Edgecombe, occupies the west shore of the sound. At the mouth of the Tamar is the small island of St Nicholas, or Drake's Island, a pyramidal rock strongly fortified. The Sound is open to the south-west, from which direction strong winds frequently blow, and violent surges are thrown in from the Atlantic. In order to protect the shipping in the harbour, a massive stone breakwater, 1700 yards in length, was constructed at a cost of about £1,500,000, and completed in 1841. See **BREAKWATER**. On a sunken rock just inside the breakwater and at its centre, a strong stone fort is (November 1864) in course of erection; and an extensive series of stone batteries are being erected at Bovisand and Picklecombe on the mainland, on either side of the entrance to the harbour. Fourteen miles south-south-west of Plymouth is Eddystone Light-house. See **EDDYSTONE**.

PNEUMATIC DISPATCH. This name is given to a mode of sending parcels and mail-bags through a tube by atmospheric pressure, or by a partial vacuum. Early in the present century, Mr Medhurst conceived the idea of some such contrivance. He published two pamphlets, one under the name of *A New Method of Conveying Letters and Goods by Air*; and the other, *A New System of Inland Conveyance for Goods and Passengers*. He proposed to construct air-tight tunnels, with carriages moving through them on rails; and these carriages were to be propelled by compressed air from behind, or else by suction, in virtue of a vacuum formed in front of

them. He also planned, as an alternative, how there might be a parcels' carriage within the tunnel or tube, and a passenger carriage running along the top of the tube: the two being connected by an upright bar passing through a valved slit in the tube. Medhurst was laughed at by his contemporaries as a visionary; but his speculations were called to mind in later years, and led to the attempts noticed under **ATMOSPHERIC RAILWAY**.

In 1861, was announced a *Pneumatic Dispatch* project, based on a reconsideration of the causes of failure in the earlier schemes. The conveyance of passengers and of bulky goods is not here contemplated; parcels and mail-bags are the articles held chiefly in view. To test the theory, a quarter of a mile of iron tube was experimentally laid down near Battersea, with a fair average of gradients and curves purposely given to it. The tube was about 30 inches in diameter, not cylindrical, but somewhat bee-hive shape in section, and flat at the bottom, to admit two lines of rail inside. Iron carriages were made to fit the tube almost as accurately as a piston. A steam-engine was set up near one end of the tube, to draw out the air by means of a sort of centrifugal fan. When the engine had been at work some little time, it rarefied the air in the tube to such a degree that the ordinary pressure of the atmosphere pushed on the carriages (which rolled by miniature wheels on the miniature railway). It was found easy to propel in this way a train, consisting of two iron carriages of 7 cwt. each, at the rate of 30 miles an hour.

After many financial discouragements, a *Pneumatic Dispatch Company* obtained capital in 1862, and began operations in 1863. The experimental tube was removed to London, and laid down beneath the roadway of Seymour Street, Euston Square, from the Euston station of the London and North-western Railway to the N. W. district post-office in Eversholt Street—a distance of one-third of a mile. The distance is too small to be commercially important, but is sufficient to shew the soundness of the plan. Several times every day (except Sundays), mail-trains arrive at Euston Station from various parts of the country. Such letters as are destined for delivery in the N. W. postal district of the metropolis, are sorted during the journey; the bags containing them are quickly transferred from the railway post-office vans to the Pneumatic Dispatch tube, and are wafted in a minute or two to Eversholt Street. They are blown through the tube from the station northward by compressed air; but the return mail-bags are sucked through the tube southward by rarefied air: the compression in the one case and the rarefaction in the other being very slight, only a few ounces on the square inch.

The plan now (October 1864) in progress may be briefly described as follows: There will be a tube laid down from Euston Square to the General Post-office in St Martin's-le-Grand, by way of Drummond Street, Hampstead Road, Tottenham Court Road, High Street, Broad Street, Holborn, Skinner's Street, and Newgate Street—a distance of 2½ miles. The tube is of large size, nearly 4½ feet in diameter, laid down at as small a depth beneath the carriage-way of the several streets as the water and gas pipes will permit. It is chiefly of cast-iron; but some portions on a sharp curve are of brick. When the arrangements are completed, there will be a large engine-house on the south side of Holborn, near Lincoln's Inn Fields, which will supply all the power for working the whole tube in both directions. Rarefied air in one half of the tube will draw a train of iron carriages, laden with parcels and mail-bags, from Euston Station to Holborn; and compressed air will drive them through the other

is, and the diminished efflux at an orifice shews that the *vena contracta* exists for gases as well as for liquids. Abundance of examples and further explanations of the properties of air will be found under such heads as ATMOSPHERE, BALLOON, BAROMETER, DIVING-BELL, MAGDEBURG HEMISPHERES, &c.

PNEUMOGASTRIC NERVE, or *Par Vagus*, derives the first of its names from its supplying the lungs and stomach with nervous filaments, and the second from the wandering course which it pursues. It emerges from the medulla oblongata by eight or ten filaments, which unite and form a flat cord, that escapes from the cavity of the cranium (in association with the glossopharyngeal and spinal accessory nerve) by the jugular foramen. In this foramen, it forms a well-marked ganglionic swelling, while another is observed immediately after its exit from the skull. The nerve runs straight down the neck between and in the same sheath as the internal jugular vein and the carotid artery. Below the root of the neck, its course is different on the two sides; the right nerve running along the back of the œsophagus, is distributed to the posterior surface of the stomach, and finally merges into the solar plexus; while the left nerve runs along the front of the œsophagus to the stomach, sending branches chiefly over its anterior surface.

From anatomical considerations, based on the distribution of this nerve, and from the results of experiments on animals, it may be concluded that this is a mixed nerve, containing filaments both of sensation and motion. The pulmonary branches exercise a most important influence upon the respiratory acts, for when the pneumogastrics on both sides have been divided above the giving off of the pulmonary branches, the most severe dyspnoea comes on, the number of respirations is much diminished, and the animal breathes as if it were asthmatic; after a short time, the lungs become congested and dropsical, and the bronchial tubes filled with a frothy serous fluid; and if the cut ends of the nerves are kept apart, the animal never survives above three days. The gastric branches influence the movements of the stomach, while their destruction does not materially affect the secretion of the gastric juice or the process of chylification. Loss of voice and difficulty of breathing have been frequently traced to the pressure of an aneurism or other tumour on the recurrent or inferior laryngeal. Hooping-cough is ascribed by many high authorities to an affection of the pneumogastric nerve; and the violent spasmodic cough which accompanies enlarged bronchial glands, is probably due to the irritation of its pulmonary branches. The sympathy which exists between the digestive and the respiratory and circulating organs, is explained by the anatomical relations of this nerve. For example, both asthma and palpitation of the heart are often to be traced to some deranged state of digestion. Vomiting may be excited by irritation of the central or the distal extremities of the nerve. In disease of the brain, the vomiting, which is often an early symptom, is caused by irritation of the central extremity; and in sea-sickness, it is that extremity also which is irritated by the disturbed state of the circulation in the cranium; while by introducing emetic substances into the stomach, the vomiting is produced by the irritation of the peripheral (or distal) filaments.

PNEUMONIA, or Inflammation of the Substance of the Lungs, is a disease which is divided by pathologists into three distinct stages, corresponding to different degrees or periods of inflammatory action. The first stage is that of *engorgement*, in which the lung or a portion of it is gorged

with blood, is of a darker colour externally, and crepitates (or crackles) less under pressure than healthy lung does; the air that ought to exist in the pulmonary cells being in a great measure replaced by fluid. On cutting the engorged portion, the section is seen to be redder than natural, and to yield a great quantity of reddish and frothy serum. The most engorged portions will generally float in water, although they are heavier than healthy lung. If the inflammation continues, new characters appear. The affected portion of the lung ceases to crepitate under pressure, and sinks when placed in water, in consequence of its now containing no air. The spongy character of the lung is gone. It is now solid, and the cut surface so closely resembles that of liver, that the term *hepatisation*, first suggested by Laennec, is generally applied to this stage. On examining with the microscope a torn fragment of the hepatised lung, it will be seen to be composed of small red granulations pressing upon one another, which are doubtless the air-cells clogged up, thickened, and made red by the inflammation. In the third and most advanced stage, the pulmonary tissue remains, as in the last stage, dense, solid, and impervious to air; but its section, in place of being red, is now of a reddish-yellow, or straw, or drab, or stone colour, or is of a grayish tint; and the little granulations which were red in the second stage, are now whitish or gray, from the presence of pus or matter, which permeates through the pulmonary tissue, rendering it very soft and friable. To this stage, which is in reality one of *diffused suppuration*, Laennec applied the terms *gray hepatisation*, or *purulent infiltration*. Besides revealing to us the above information regarding the changes which the pulmonary textures undergo in the three stages of this disease, morbid anatomy teaches us that inflammation does not attack all parts of the lung on both sides indiscriminately. It is much more common on the right side of the body than the left. Of 210 cases collected by Andral, 121 were on the right lung alone, and 58 on the left side alone; while in 25 it was double (i. e., occurred in both lungs), and in six the seat was uncertain; so that pneumonia is more than twice as common on the right side as on the left, and only occurs on both sides together as often as once in eight times. According to Grisolle, however, whose *Traité Pratique de la Pneumonie* is the standard work on this disease, the relative frequency with which the right lung is affected is rather less than two to one (11 : 6). Moreover, pneumonia is considerably more common in the lower than in the upper lobes of the lung—a point of great importance in diagnosis. Of 88 cases observed by Andral, the inflammation was found to affect the lower lobe 47 times; the upper lobe, 30; and the whole lung at once, 11. Inflammation of the bronchial tubes so constantly accompanies inflammation of the tissues of the lung, that although bronchitis often exists without pneumonia, pneumonia never occurs without bronchitis. Moreover, a certain amount of pleurisy or inflammation of the investing membrane, accompanies pneumonia in a very large majority of cases. The alterations which take place in the tissue of the lung give rise to important modifications of the ordinary sounds yielded by auscultation and percussion; the discrimination of which, however, belong to the physician.

The following are the general symptoms, as distinguished from the physical signs, of pneumonia. The disease generally commences with inflammatory fever; and pain in the side, due to pleurisy in most cases, soon supervenes. The breathing is always more or less affected, especially when the

POACHING.

to the exclusive privilege of killing the game, can alone give permission to a stranger to go and kill game there; and if this permission is not obtained, such stranger, whether qualified or not—i.e., whether he pays the government tax or not—is a poacher, if he go and kill the game. In England, there is a Day-poaching Act and a Night-poaching Act, imposing penalties on poachers. By the Day-poaching Act (1 and 2 Will. IV. c. 32, s. 30), whoever unlawfully goes upon lands not his own to pursue or kill not only Game (q. v.), but also rabbits, woodcocks, snipes, quails, and landrails, is liable to a penalty of £2. It has been held that this offence is committed whenever a stranger has *de facto* gone upon the lands to shoot without having previously expressly obtained the permission of the party entitled to the game, even though he may have had good reason to believe that such permission, if asked, would have been granted as a matter of course, and though, after hearing of the trespass, the owner quite approved and ratified it. Moreover, any person whatever, whether interested in the lands or not, may institute the proceedings for the punishment of the poacher; and the informer is entitled to half the penalty, the other half going to the poor of the parish. When a poacher is found trespassing on lands in search of game, the person entitled to the game there, or the tenant, or a gamekeeper, or servant of either, may demand the poacher's name and place of abode, and if it is refused, may arrest such poacher, and take him before a justice of the peace; but the poacher must be taken within twelve hours before the justice, otherwise he is entitled to go at large. It is only the persons named (and not any one of the public, or even a constable) who can arrest the poacher, and it can only be done when he is caught in the act on the very lands; for if the poacher clear the fence, and go on to other lands, he cannot then be arrested at all. If game is found on the poachers at the time they are caught, and it appear to have been newly caught, the party who is entitled to arrest him is entitled to seize the game also. If the poacher when convicted do not pay the penalty within the time fixed by the justices, he may be committed to the house of correction for a period not exceeding two calendar months. The party may appeal against his conviction to the Court of Quarter Sessions; but he must either remain in custody in the interval, or give security for the costs. The offence of poaching is punished more severely when five or more go out together, shewing thereby an attempt to intimidate gamekeepers and others, and in such case, each is liable to a penalty of £5. Moreover, if any of these five or more persons, acting in concert, be armed with a gun, and use violence, each is liable to an additional penalty of £5. As to the Night-poaching Act (9 Geo. IV. c. 69), it is provided, that any person by night—i.e., between the first hour after sunset and the first hour before sunrise—unlawfully trespassing in search of game, shall for a first offence be committed by the justices to the house of correction for three months, or in some cases for six months; for a second offence, shall be committed for six months, or in some cases for twelve months; and for a third offence, shall be guilty of a misdemeanour, and be imprisoned for two years. In case such night-poachers are found on the lands and in the act, the owner or occupier of the land or his servants may arrest the poachers, and take them before justices. If the night-poacher, when arrested, use firearms, sticks, or offensive weapons, he shall be guilty of a misdemeanour, and be punishable by two years' imprisonment in addition. In case of three or more night-poachers being armed with guns, bludgeons, or other offensive weapons, each is guilty of a

misdemeanour, and is liable to imprisonment for three years. Poachers have no right to kill game on the highway any more than in fields or enclosures, for the owners of the adjoining land are entitled to the game on the highway. Under the former law, it was, as already mentioned, incompetent for any person except the owner or occupier of the lands to apprehend the poacher, and even this could only be done when the poacher was caught in the act on the lands themselves; and hence, even constables had no power to seize the poacher, though seen to be coming from such lands. But by the recent Poaching Prevention Act (25 and 26 Vict. c. 114), which applies to the United Kingdom, if a constable now meet a suspected poacher on the highway, whom he has reason to suspect of coming from land where he has been poaching, such constable may stop and search the poacher; and if game, or implements for taking game, are found on him, may seize and detain them, and summon him before the justices. When before the justices, if it be proved by circumstantial evidence or otherwise that such game was procured by poaching, or that the implements were used, the poacher may be fined in a penalty of £5, besides forfeiture of the game, and guns, nets, and other implements which he may have so used. The person convicted may appeal, if he chooses, to the next Quarter Sessions, or, in certain cases, to the Court of Queen's Bench. With regard to the poacher's property in the game he kills, it is only in those cases where he is caught in the act, and on the spot, that the game can be taken from him; and this, for obvious reasons, seldom happens. In all other cases, the general rule applies, that whoever first catches (whether legally or illegally) a wild animal, is entitled to the property in it; and as game is in the category of wild animals, the poacher, though, it may be, committing several offences in catching the game, is yet generally entitled to keep it against all comers. The law of Scotland does not materially differ from that of England as to poachers; and the Night-poaching Act applies to it equally as to England. The Scotch Day Trespass Act (2 and 3 Will. IV. c. 68) closely agrees with the English act. But it is singular, that, in the case of night-poachers, the game cannot be taken from the poacher, even when caught in the act and on the lands; though it can be so in England.—*Paterson's Game-laws of the United Kingdom*, p. 172. The act conferring power on constables to stop and search poachers on the highway, also extends to Scotland. In England, the poaching of hares or rabbits by night in preserves is a misdemeanour; whereas it is only an offence punishable summarily in Scotland. In Ireland, the law as to poaching is not identical with the law of England, there being distinct statutes; but substantially the law is the same.—*Paterson's Game-laws*, 182. The law of the United Kingdom has often been described as too severe against poachers, inasmuch as most of the penalties are cumulative, and the justices who administer the laws are generally game-preservers, and so inclined to convict on the smallest scintilla of evidence. But, on the other hand, it is answered, that poaching is in reality only stealing under a milder name, and that the classes who poach are divided by a thin partition from thieves, game being, in every point of view, as much the fruit of the soil as apples or turnips, and the transition from habitual poaching to stealing being not only easy, but inevitable.—See *Paterson's Game-laws*.

2. *Poaching fish* is the unlawfully entering on another's fishery in order to catch fish. The law of fisheries is not uniform in the United Kingdom. In England, the general rule is, that any one of the

POAK—POCHARD.

trout or other fresh-water fish with a net, or by double-rod fishing, or cross-line fishing, or set lines, &c., incurs a penalty of £5, besides forfeiture of the fish caught. And he may be arrested if he is net-fishing, but not if he is fishing in another way. Moreover, a mere angler of trout, though a poacher, cannot be arrested, nor yet punished by any penalty; though he is liable to an action at law, which, however, is virtually no remedy at all. So, in the case of all poachers of trout (except angling poachers, who can neither be arrested, nor yet have their fish or fishing-rod taken from them by force), the owner of the fishery, or any person authorised by him, may seize the nets, boats, and fishing implements, if the poachers are found on the spot. Though angling for trout is thus privileged in Scotland above what it is in England in this respect, that the poaching angler cannot be arrested or fined by justices of the peace, but is only liable to an action, yet the poaching angler of salmon may be fined. The public have no right to angle from a highway adjoining a stream. Where a stream runs through a farm, the farmer has a right to angle for trout, unless the lease expressly forbid it; but he cannot fish for salmon with a net, or even by angling, for it interferes with the crown grantee, if there is one. It has also been held that he cannot fish for trout with a net, but this decision is supposed to be unsound, and would probably be reversed, if the point were raised. There is a special salmon statute for the river Tweed, and for the Solway and the Scotch rivers running into these, and for some other rivers; but these statutes do not substantially differ from the general law.

In Ireland, the law of poachers of fish is the same as in England in all the main points, for the same statute applies. There are also various special acts affecting the salmon and sea-fisheries of Ireland, which vary from the law of England; but as they do not peculiarly affect the law of poaching, it is unnecessary to specify them. See the whole subject explained in *Faterson's Fishery Laws of the United Kingdom*.

POAK. Under this name, the scrapings of the flesh-side of skins in fellmongers' and tanners' yards, together with the other animal refuse, are sold to the manure-dealers.

POCAHONTAS, daughter of Powhatan, an Indian chief of Virginia, was born about 1595. When she was 12 years old, Captain John Smith, the ablest leader of the colony of Jamestown, fell into the hands of Powhatan, and was about to be killed. P. rushed between the victim and the uplifted arm of the executioner, and besought her father to spare his life. The savage chieftain relented; and Smith was conducted in safety to Jamestown, where the young chieftainess with her wild train often visited him. In 1609, she gave him timely notice of a plot to destroy him, and took refuge from her father's anger with another chief. Captain Smith having returned to England, she was taken by Captain Argall, by bribery, held as a hostage, and married to John Rolfe in 1613, and baptised by the name of Rebecca. This alliance with a powerful chief secured a long peace to the colony. In 1616, she was brought to England by her husband, where she was received with great favour, and presented at court. Here also she saw Captain Smith, and at the first interview hid her face two or three hours. She had been told that he was dead. From this blow, she appears never to have recovered. She died at Gravesend, 1617, when about to embark for her native country, after giving birth to a son, from whom are descended the Randolphs and other distinguished families of Virginia.

POCHARD (*Fuligula*), a genus of ducks, of the oceanic section (see DUCK), having the bill as long, or nearly as long as the head, broad and very flat, a little dilated towards the tip, the lamellæ of the upper mandible not projecting beyond the margin, the wings and tail short, the tail rounded. The windpipe of the male, in all the pochards, terminates in a labyrinth composed partly of bone and partly of membrane. There are numerous species, some of them natives of the arctic regions; some found, at least in winter, on the coasts of most parts of Europe, Asia, and North America; and some in the southern hemisphere. The COMMON P. (*F.*—or *Nyroca ferina*), also known as the DUK BIRD, and as the

Pochard (*Fuligula ferina*).

Red-headed Pochard and *Red-eyed Pochard*, is a frequent winter visitant of Britain. It breeds in very northern regions; and is abundant in all of them, but in winter migrates southwards, in America as far as Carolina and Louisiana, whilst in Asia it has been found even in Bengal. It is smaller than the mallard, but rather larger than the wigeon. The head and neck are bright chestnut, the eyes red, characters which at once distinguish it from every other British duck. It is highly esteemed for the table. Great numbers are sold every winter in the London market.—Several other species are reckoned among British birds.—The TUFTED DUCK (*F. cristata*) is a frequent winter visitant of the bays, estuaries, and lakes of Britain. It is a plump and short bird; black, with a white bar on the wing; the breast, belly, and sides white. The occipital feathers are elongated.—The CANVAS-BACK DUCK (*F. Valisneria*) of North America is a species of pochard.

Canvas-Back Duck (*Fuligula valisneria*).

It is very like the Common P., but is much larger, and has the bill higher at the base, and less dilated towards the tip. The upper parts are also whiter. The Canvas-back Duck breeds in the northern parts of America, and migrates southward in flocks in autumn. In winter, it abounds particularly on the

PODOCARPUS, a genus of trees of the natural order *Conifere*, suborder *Taxineæ*, the order *Taxaceæ* of some botanists. The leaves, like those of the allied Ginkgo tree, have a remarkable resemblance to the fronds of ferns. The species are natives of New Zealand, the South Sea Islands, and the Indian Archipelago. Some of them are valuable timber trees. *P. cupressina* is one of the best timber trees of Java. It is found also throughout the neighbouring islands and the South Sea Islands. It is a beautiful tree, 50 to 80 feet high, with spreading pendulous branches; the wood is yellowish, and takes a very fine polish. *P. totarra*, the **TOTARRA** or **TOTARRA PINE**, is the most valuable timber tree of New Zealand. It grows in the southern parts of New Zealand, and its trunk has been known to attain a diameter of fully 12 feet. Its wood is equal to the best Baltic pine in durability and for ship-building. The wood of *P. datus*, the **GAGALI** of the Fijians, is peculiarly elastic.

PODOLIA, or **KAMINETZ**, a government of West or 'White' Russia, north of Bessarabia, and bordering on the Austrian frontier. Area, 16,170 sq. m.; population, 1,748,466. The surface is a table-land, strewn with hills, and containing many beautiful districts. Nearly three-fourths of P. is either arable or available for pasturage. Great quantities of corn and fruits, especially melons, are produced, and the fine climate is also favourable to the growth of the vine and mulberry. Hemp, flax, and tobacco are cultivated with success, and the rearing of bees is an important branch of industry. So rich and strong is the grass in the pastures or prairies, that the cattle, of which there are immense herds, can hide themselves from view in it. The population is composed of various races, who live together unmixed. The Russians (until lately 'bondagers' or 'serfs') form the majority, and are over a million in number; next come the Cossacks; and then the Jews, who are almost all traders and townspeople. The aristocracy are Poles; but the officials and soldiery, Russians. The government is divided into twelve districts.

PODOPHTHALMA (Gr. stalk-eyed), a name often applied to a section or sub-class of Crustaceans, part of the *Malacostraca* of Cuvier, including the orders *Decapoda* (Crabs, Lobsters, &c.) and *Stomatopoda* (Shrimps, &c.). A distinguishing character,

Sentinel Crab.

from which they derive their name, is their stalked and movable eyes. The stalks of the eyes are short in many, but very long in some, of which a beautiful example is presented by the Sentinel Crab of the Indian Ocean.

PODOPHYLLIN is the name commonly given to the resin obtained by means of rectified spirit from the root of *Podophyllum peltatum*, or *May-apple*, a plant common throughout the United States. This resin, which occurs as a pale greenish amorphous powder, has (as well as the root from which

it is derived) been introduced into the new British Pharmacopœia, in consequence of the general favour which it has experienced during the last three or four years from the medical profession in this country. It is an active purgative, and seems to have the power of relieving the liver by exciting copious bilious discharges. As its activity seems to vary in different patients, it is better to begin with a small dose of half a grain, which may be combined with extract of henbane, with the view of preventing its griping. It is likely to prove one of the most valuable additions to our pharmacopœia.

PODOPHYLLUM, a genus of plants variously ranked by botanists in the natural order *Ranunculaceæ*, or made the type of a small distinct order, *Podophylleæ* or *Podophyllaceæ*, differing from *Ranunculaceæ* chiefly in having a solitary carpel. The genus P. has 3 sepals, 6 to 9 petals, 12 to 18 stamens, a broad round stigma, seated almost on the top of the germen, and a many-seeded berry. *P. peltatum* is a perennial plant, with a solitary white flower in the axil of the two leaves; the fruit oval, an inch and a half long, smooth, yellowish, succulent, having a mawkish sweet and subacid taste. It is common in North America, growing in moist woods and on the shady banks of streams, and is known as **MAY-APPLE**, because it flowers and ripens its fruit very early in summer, also as *Hog-apple* and *Wild Lemon*. The fruit may be eaten, but is not agreeable. All the other parts are actively cathartic. See **PODOPHYLLIN**.

PODURA, a genus of small wingless insects of the order *Thysanoura* (q. v.), having a linear or cylindrical body, a distinctly articulated thorax, rather long antennæ, and a long abdomen, terminating in a tail, which divides at its extremity into two branches. They bend the tail beneath the abdomen, and by suddenly extending it, make prodigious leaps. Hence their popular name, **SPRING-TAIL**. The species of this and allied genera are numerous, and some are found on plants, some under stones and in other damp places, some on the surface of stagnant waters. Their bodies are covered with scales, which are extremely interesting objects, and are among the favourite test-objects for the powers of microscopes.



Podura villosa.

POE, **EDGAR ALLAN**, perhaps the finest and most original poetical genius as yet produced by America, was born at Baltimore in January 1811. Though he came of a good family, his father and mother held no higher social position than that of strolling players. They died while he was yet a mere child; and he was adopted by a Mr John Allan, a rich merchant, who had no children of his own. In 1816 the little Edgar came to England with Mr and Mrs Allan, and was sent to a school at Stoke Newington. In 1822 he returned to America, and attended an academy at Richmond in Virginia, whence he was in due time transferred to the university of Charlottesville. His talent was from the first conspicuous, but unhappily he developed along with it, and continued through life to exhibit a desperate profligacy in all kinds, almost without a parallel in the descents and degradations of genius. Expelled from the university on account of this, he returned to Mr Allan, with whom he presently quarrelled, on the ground of that gentleman's natural reluctance to become responsible for his debts. Quitting the house of his benefactor, he started for Greece, in foolish parody of Byron, &c

P. demanded to be confronted with Jervolino, but this was refused. When this accusation also fell to the ground, Peccheneda, who was at the head of the police, tried to induce the others who were indicted for political reasons to denounce P. as a revolutionist, promising them liberty as the reward. His design partly succeeded. He extorted from Romeo the printer, and from Margherita some false accusations, which the fear of death caused those unfortunate persons to make. But they were of no avail, and recourse was again had to the accusation made against P. by Jervolino; and although P. brought forward many clear proofs that the informer was paid by the police to do him harm, the court paid no attention to that, nor to any other of his objections, and concluded by inflicting on him the penalty of passing 24 years in irons, and of a heavy fine.

Thus Carlo P., a minister, and a member of parliament, a man of rare genius and of exemplary life, was cast into the hulks at Nisida, dressed as a felon, and dragging 15 pounds of chains; and thence, through the suspicions of the government, who dreaded his escape, he was conveyed from hulks to hulks, from Nisida to Procida, from Ischia to Montefusco, and finally to Montesarchio. Assassins and thieves were given him as companions in order to humble him, as if the virtue of the truly great man could be sullied by the presence of miscreants and cut-throats. He indignantly spurned the proposal to petition for his liberty.

The protests of the English and French diplomats against the iniquitous state trials, which had been instituted in Naples with the sole object of condemning persons obnoxious to the king; the letters of Mr Gladstone; the constant dread of a popular rising on behalf of the condemned political offenders, and especially of P., disturbed the mind of Ferdinand II. to such a degree that he sought some means of ridding himself of the prisoners of Montesarchio. Having failed in every attempt to force them to ask pardon, he resolved to send them to America. On the 19th January 1859, P. and 66 other prisoners, among whom were Settembrini, Spaventa, Pica, the Duke of Castromediano, Braico, Schiavoni, Argentino, Pace, Damis (all of whom are now members of the Italian parliament), were conveyed to Pozzuoli, and put on board of the *Stromboli*, which immediately set sail for New York. When they reached Cadiz, P. and his companions were put on board an American vessel, the captain of which, however, was induced to land them at Cork, whence they returned, by London, to Turin. In the following year P. was elected deputy by two colleges in Tuscany, and took his seat in parliament.

When Garibaldi (q. v.) had driven out the Bourbon dynasty, P. returned to Naples. He declined the ministerial office offered to him by Cavour, and also the governorship of the southern provinces proposed to him by Costantino Nigra, but accepted the office of privy councillor. The privy council elected him its vice-president; then, being re-elected deputy, he was proclaimed vice-president of the parliament.

POET-LAUREATE See LAUREATE.

PO'ETRY (from the Greek *poieo*, to make, or to create), according to the mere etymology of the word, signifies a creation or production of any kind; but its classical equivalent, *poiesis*, was applied by the Greeks almost exclusively to designate the artistic productions of the imagination, expressed in language. Poetry is thus not necessarily associated—as many people seem to think

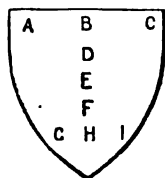
—with verse or rhyme. It may find expression in prose, and in point of fact has often done so, both in ancient and modern times. The Book of Ruth, for example, is decidedly poetical in substance, yet in form it is strictly prosaic. The same may be said in a still more remarkable degree of the Book of Job and the Prophetical Writings, as they appear in our English version. Jeremy Taylor, Hooker, Rousseau, Burke, Carlyle, Ruskin, Hawthorne, Emerson, and other modern prose writers, are often as richly or profoundly imaginative as poets by profession; but although the essence of poetry lies rather in the nature and adornment of the thoughts expressed than in the form of the composition, yet in general it has subjected itself to certain rules of *metre* or measure, and often also to rules of *rhyme*. The reason of this practice lies in the fact that the music so produced by the mere words is found to heighten the emotions which their meaning is calculated to produce, and thus furthers the end that the poet has in view. It is from this circumstance that the term poetry has become almost synonymous with metrical composition. Poetical compositions are of several kinds or classes, to which particular terms are applicable; the principal are the Epic (q. v.), the Lyric (q. v.), and the Drama (q. v.). To the first of these belongs the Ballad (q. v.); to the second belong the Song (q. v.) in all its varieties, serious and comic, the Hymn (q. v.), Ode (q. v.), Anthem (q. v.), Elegy (q. v.), Sonnet (q. v.), &c.; the third embraces Tragedy and Comedy. Besides these three principal kinds, others of less consequence may be mentioned, such as Didactic Poetry (q. v.), Satirical Poetry (see SATIRE), in which, however, imaginative and ideal elements in general mingle so sparingly that the stricter kind of critics exclude them from the circle of poetry altogether. The Germans have produced several treatises on the history of poetry, such as Rosenkranz's *Handbuch einer allgemeinen Geschichte der Poesie* (3 vols. Halle, 1832), and Zimmermann's *Geschichte der Poesie aller Völker* (Stuttg. 1847).

POGGE (*Aspidophorus Europæus*), a fish of the family *Sclerogenidae*, or *Mailed Cheeks*, and nearly allied to the Bullhead (q. v.), but having the body cuirassed with large bony scales from the head to the tail fin, so that it is in form nearly a pyramid with eight faces. The head is thicker than the body, with points and depressions, the snout furnished with short recurved spines. The P. is also known on the coasts of England as the *Armed Bull-head*; and on the coasts of Scotland by the names *Lyrie*, *Pluck*, and *Noble*. It is pretty common on the British coasts. It is seldom more than six inches long. Notwithstanding its uncouth appearance, its flesh is good.

POGGENDORF, JOHANN-CHRISTIAN, a German physicist, was born at Hamburg, 29th December, 1796. He studied pharmacy, chemistry, and physics; and since 1834 has been professor of the last-mentioned science at Berlin. In 1838 he became a member of the Academy of Sciences. His chief discoveries have been in connection with electricity and galvanism, and these are reckoned of great value; he has also invented a multiplying galvanometer for measuring the calorific action of currents. Since 1824 he has edited the *Annales der Physik und Chemie*, contributing to this collection many important memoirs. He was one of the triad (Liebig and Wöhler being the other two) who prepared the *Dictionnaire de Chimie* (Brunswick, 1837—1851). The two works published by himself are the *Linien zu einer Geschichte der exakten Wissenschaften* (Berlin, 1853), and *Biographisch*

hair short, the ears pendulous, the upper lips moderately large, the tail pointed and destitute of brush. Dogs of this breed are very active, and capable of long-sustained exertion. The original breed, the *Spanish P.*, probably brought to Spain from the East, is of more bulky form, less active habit, and less capability of continued exertion. The *P.* is very forward and familiar in its manners, but is both affectionate and intelligent, although it has a reputation of inferiority in these respects to many other kinds of dogs.

POINTS OF THE ESCUTCHEON, in Heraldry. In order to facilitate the description of a coat-of-arms, it is the practice to suppose the shield to be divided into nine points, which are known by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the collar or honour point; E, the fess point; F, the nombril or navel point; G, the dexter base point; H, the middle base point; and I, the sinister base point. The dexter and sinister sides of the shield are so called, not in relation to the eye of the



Points of the
Escutcheon.

spectator, but from the right and left sides of the supposed bearer of the shield.

POISON UDER, POISON IVY, POISON OAKS, POISON SUMACH, AND POISON VINE. See SUMACH.

POISONING, SECRET, a mode of taking away life by poisons so slow in their operation that the gradual sinking of the victims under their influence closely resembled the effects of disease or the ordinary decay of nature. It has been practised in all ages, and several undoubted and numerous supposed instances of it are mentioned by Greek and Roman writers. It was not, however, till the 17th c. that this atrocious practice became of frequent occurrence; but from this time it rapidly increased, spread over Western Europe like an epidemic, and became gradually a regular branch of education among those who professed a knowledge of chemistry, magic, or astrology. These persons regarded the knowledge of the mode of preparing secret poisons as of the highest importance, and many of them realised large sums by the sale of their preparations, and occasionally of the secret of their composition. It was in Italy and France that this art was chiefly practised and brought to the highest perfection; but it seems also to have prevailed in England to a considerable extent, for we find that, in the 21st year of Henry VIII.'s reign, an act was passed declaring the employment of secret poisons to be high treason, and sentencing those who were found guilty of it to be boiled to death. The only undoubted instance of this crime which appears prominently in English history is the murder of Sir Thomas Overbury (q. v.) by Viscount Rochester (the favourite minion of James VI.) and his wife, the divorced Countess of Essex; though many suppose, and with some show of probability, that James VI. himself was a victim to similar nefarious practices on the part of Villiers, Duke of Buckingham; and undoubtedly such was the popular impression at the time, for Dr Lamb, a conjuror and quack, who was believed to have furnished Buckingham with the poisons, was seized by the angry populace in Wood Street, Cheapside, London, and beaten and stoned to death. But it was in Italy where this mode of poisoning was most prevalent. There, judging from the writings of various authors, it seems to have been looked upon as a not

unjustifiable proceeding to get rid of a rival or enemy by poison; and from the time of the Lombard invasion down to the 17th c., Italian history teems with instances which sufficiently shew that poison was both the favourite weapon of the oppressor, and the protection or revenge of the oppressed. The Borgias are generally singled out and held up to the horror and detestation of mankind; but as far as their poisonings are concerned, they merely employed this method of destroying their adversaries a little more frequently than their neighbours. To shew the popular feeling on this subject we may instance the case mentioned in the memoirs of Henry II., fifth Duke of Guise, of a soldier who was requested to rid the duke of Gennaro Annesse, one of his opponents in Naples. *Assassination* was the mode proposed to the soldier, but he shrank with horror from the suggestion, stating at the same time that he was quite willing to *poison* Annesse. It was shortly after the date of this story (1648) that secret poisoning became so frequent; and the Catholic clergy, despite the rules of the confessional, felt themselves bound to acquaint Pope Alexander VII. with the extent of the practice. On investigation, it was found that young widows were extraordinarily abundant in Rome, and that most of the unhappy marriages were speedily dissolved by the sickness and death of the husband; and further inquiries resulted in the discovery of a secret society of young matrons, which met at the house of an old hag, by name Hieronyma Spara, a reputed witch and fortune-teller, who supplied those of them who wished to resent the infidelities of their husbands with a slow poison, clear, tasteless, and lumpless, and of strength sufficient to destroy life in the course of a day, week, month, or number of months, as the purchaser preferred. The ladies of Rome had been long acquainted with the 'wonderful elixir' compounded by La Spara; but they kept the secret so well, and made such effectual use of their knowledge, that it was only after several years, during which a large number of unsuspected victims had perished, and even then through a cunning artifice of the police, that the whole proceedings were brought to light. La Spara and thirteen of her companions were hanged, a large number of the culprits were whipped half-naked through the streets of Rome, and some of the highest rank suffered fines and banishment. About half a century afterwards, the discovery was made of a similar organisation at Naples, headed by an old woman of threescore and ten, named Toffania who manufactured a poison similar to that of La Spara, and sold it extensively in Naples under the name of *acquetta*, and even sent it to all parts of Italy under the name of 'Manna of St Nicola of Bari,' giving it the same name as the renowned miraculous oil of St Nicola, to elude discovery. This poison, now best known as the 'Acqua Tofana' or 'Acqua di Perugia,' is said by Hahnemann to have been compounded of arsenical neutral salts; while Garelli states that it was crystallised arsenic dissolved in a large quantity of water; but both agree that it produced its effect almost imperceptibly, by gradually weakening the appetite and respiratory organs. After having directly or indirectly caused the death of more than 600 persons, Toffania was at length seized, tried, and strangled in 1719. From this time the mania for secret poisoning gradually died away in Italy.

About the middle of the 17th c., this horrible practice seems to have first become prevalent in France, and under similar circumstances, the agents being married women, and their husbands the victims; and as in Italy, the extent to which the

salts, as oxalic acid, binxalate of potash, and tartaric acid (in doses of half an ounce or more); the alkalies, as pearl-ash (carbonate of potash), soap lees (carbonate of soda), ammonia and its sesquicarbonate; and metallic compounds, as white arsenic (arsenious acid), yellow arsenic (orpiment), corrosive sublimate, bichloride of mercury, permanganate and other salts of this metal, acetate of lead (sugar of lead) in doses of an ounce and upwards, carbonate of lead (white lead), sulphate of copper (blue vitriol), subacetate of copper (verdigris), arsenite of copper (commonly known as *Scheele's green* or *emerald green*, and much employed under the name of *extract of spinach* for colouring confectionery), tartarised antimony, chloride of antimony (butter of antimony), chloride of zinc (Sir W. Burnett's Fluid), nitrate of silver (lunar caustic), sulphate of iron (copperas or green vitriol), and bichromate of potash. (2.) Vegetable Substances, viz. colocynth and gamboge in large doses, savin, croton oil, the leaves and flowers of the common elder (*Sambucus nigra*), &c.; and (3.) Animal Substances, such as cantharides, to which must be added the occasional cases in which sausages, and certain fish and molluscs, usually quite innocuous, act as irritant poisons.

The *Narcotic Poisons* include opium, hydrocyanic (or prussic) acid, oil of bitter almonds, cyanide of potassium, henbane, especially the seeds, camphor, alcohol, ether, and chloroform; while *Narcotico-Irritant Poisons* are nux vomica, meadow saffron (*Colchicum*), white hellebore, foxglove, common hemlock, water hemlock (*Cicuta virosa*), hemlock water-dropwort (*Eranthe crocata*), fool's parsley, thorn-apple, monkshood or wolf's bane, deadly nightshade, tobacco, Indian tobacco (*Lobelia inflata*), the bark and seeds of the common laburnum, the berries and leaves of the yew-tree, and certain kinds of mushrooms.

The cases in which there are antidotes qualified to neutralise chemically the action of the poison are few in number. For the *mineral acids* we must prescribe chalk or magnesia in water, with the view of neutralising them, after which milk should be given freely. The *alkalies* and their carbonates must be neutralised by vinegar and water, or lemon-juice mixed with water, after which milk should be given. For *oxalic acid* the antidote is chalk or magnesia in water, by which an insoluble oxalate of lime or magnesia is formed. For *arsenic*, the hydrated peroxide of iron has been regarded as an antidote, but its efficacy is doubtful. Vomiting should be excited by the administration of a scruple of sulphate of zinc in warm water, and after the stomach has been well cleared out, demulcent fluids, such as flour and water or milk should be given. *Corrosive sublimate* combines with albumen (white of egg), and forms an insoluble inert mass; *nitrate of silver* is neutralised by chloride of sodium (common salt) dissolved in water; *tartarised antimony* is to a great degree rendered inert by the administration of decoction of bark or gall-nuts; and *acetate of lead* is rendered inert by the administration of sulphate of magnesia, which converts it into an insoluble sulphate of lead. In all cases of suspected poisoning, in which the nature of the poison is not known, the safest course is at once to produce vomiting by sulphate of zinc, or in its absence by a dessert-spoonful of flour of mustard suspended in tepid water, and to continue the vomiting till all the contents of the stomach are discharged, after which milk should be given freely.

Most of the known gases—except hydrogen, nitrogen, and oxygen—have a poisonous action when inhaled into the lungs; but in these cases death, if it ensues, is popularly said to be due to

suffocation, although strictly speaking a person who dies from the effect of carbonic acid, or sulphuretted hydrogen, or of any other noxious gas, is in reality just as much poisoned as if he had taken oxalic acid or arsenic. *Carbonic acid* (q. v.), although seldom employed as an instrument of murder, is a frequent cause of accidental death, and in France is a common means of self-destruction. It is established by numerous experiments that air containing more than *one-tenth* of its volume of carbonic acid, will, if inhaled, destroy life in man and the higher animals. In its pure state it cannot be inhaled, because its contact with the larynx causes spasmodic contraction of the glottis; but when diluted with two or more volumes of air, it can be breathed, and produces symptoms of vertigo and somnolency; and so great a loss of muscular power, that the individual, if in an erect or sitting position, falls as if struck to the ground. The respiration, which at first is difficult and stertorous, becomes suspended. The action of the heart is at first violent, but soon ceases, sensibility is lost, and the person now falls into a comatose or death-like state. Those who have been resuscitated usually feel pain in the head and general soreness of the body for some days, and in a few severe cases, paralysis of the muscles of the face has remained. As a winter seldom passes without several deaths being recorded from coal or charcoal being employed as fuel in ill-ventilated rooms (often without any kind of chimney), it is expedient that every one should know what is to be done in such an emergency. The patient must, of course, be at once removed from the poisonous atmosphere, after which artificial respiration should be had recourse to. If the skin is warm, cold water may be poured on the head and spine; while if the surface be cold, a warm bath should be employed. When respiration is re-established, venesection will often relieve the congestion of the vessels of the brain. The inhalation of oxygen gas is said to have been of service in these cases. *Carbonic oxide*, which exists largely in coal gas, is at least as active a poison as carbonic acid, and is doubtless the principal cause of the effects produced by the inhalation of diluted gas. Both carbonic acid and carbonic oxide act as powerful narcotic poisons. *Sulphuretted hydrogen*, which occurs abundantly in foul drains, sewers, cess-pools, &c., is a gaseous poison whose effects are often noticed. Nothing certain is known of the smallest proportion of this gas required to destroy human life; but air containing only one eight-hundredth of its volume of this gas will destroy a dog; and when the gas exists in the proportion of one two-hundred-and-fiftieth, it will kill a horse. Dr Taylor states that the men who were engaged in the construction of the Thames Tunnel suffered severely from the presence of this gas, which was probably derived from the action of the water on the iron pyrites in the clay, and which issued in sudden bursts from the walls. By respiring this atmosphere, the strongest and most robust men were in the course of a few months reduced to an extreme state of exhaustion, and several died. The symptoms with which they were first affected were giddiness, sickness, and general debility; they became emaciated, and fell into a state of low fever accompanied by delirium. In this case the dilution was extreme; when the gas is breathed in a more concentrated form, the person speedily falls, apparently lifeless. It appears to act as a narcotic poison when concentrated; but like a narcotico-irritant when much diluted with air.

The action of the vapour of *hydrosulphate of ammonia*, which is also commonly present in cess-pools, &c., is probably much the same as that of

Franks under Charles Martel (q. v.) and the Moors under Abd-ur Rahman. The Moors were routed with enormous slaughter—375,000 of them (according to one old exaggerating chronicler) being left dead on the field; later still (in 1356), at Mau-pertuis-le-Beauvois, about 5 miles north of P., Edward the Black Prince, with some 12,000 or 14,000 Englishmen and Gascons, beat 60,000 of the troops of King Jean of France, and took the monarch himself and one of his sons prisoners.

POITOU, a former province of Western France, is now mainly comprised in the departments of Deux Sèvres, Vendée, and Vienne. It was divided into Upper and Lower P., and had for its capital Poitiers (q. v.). P. first became a possession of the English crown when Eleanor, Countess of P. and Duchess of Aquitaine, after her divorce from Louis VII. of France in September 1151, married, on Whitsunday following, Henry of Anjou, afterwards Henry I. of England. Philippe-Auguste reconquered the province in 1204, and in 1295 it was formally ceded to France. By the peace of Bretigny, in 1360, it again reverted to England, but was soon after retaken by Charles V., who gave it to his brother, the Duke of Berri. It was subsequently incorporated with the French crown.

POITRINAL, or PECTORAL, in ancient armour, was the horse's breastplate, formed of metal plates riveted together as a covering for the breast and shoulders.

POLA, the most important naval station of Austria, and one of the most beautiful havens in Europe, belongs to the Markgratate of Istria. The town occupies an eminence overlooking the Adriatic Sea, 75 miles by sea south of Trieste. The bay is thoroughly sheltered, and is spacious enough to accommodate the largest fleet. The town is surrounded by bastioned walls, is protected by numerous batteries, and is overlooked by the citadel by which it and the bay are commanded. Pop. 2500.

P., a very ancient town, is said to have been founded by the Colchians, who were sent in pursuit of Jason. It was destroyed by Julius Cæsar, but rebuilt by Augustus at the request of his daughter Julia, on which account it was named *Pietas Julia*. In ancient times it had 30,000 inhabitants, and was a station of the Roman fleet. It contains numerous and interesting Roman remains, among which are a beautiful and well-preserved amphitheatre, 436 feet long, and 346 broad. A temple and several ancient gates are also extant. See Allason's *Antiquities of Pola* (Lond. 1819).

POLA'CCA, or POLONAISE, a Polish national dance of slow movement in $\frac{3}{4}$ time. It always begins and terminates with a full bar, and a peculiar effect is produced by the position of its cadence, the dominant seventh in the second crotchet of the bar preceding the triad on the third crotchet:



The characteristic

features of the polacca are sometimes adopted in a Rondo, or other lively and brilliant composition, which is then said to be written *Alla Polacca*.

POLACCA, or POLACRE, a species of vessel in use in the Mediterranean, with three masts and a jib-boom; the fore and main-masts being of one piece ('pole-masts'), and the mizen-mast with a top and top-mast. They generally carry square sails, though a few are rigged with a peculiar form of

sail to which the term *polacre* is also applied. The fore and main-masts have, of course, neither tops, caps, nor cross-trees.

POL'LAND, called by the natives *Polska* (a plain), a former kingdom of Europe—renowned in medieval history, as the sole champion of Christendom against the Turks; and more recently, and at present, an object of general and profound sympathy throughout Western Europe, from its unprecedented misfortunes—was, immediately previous to its dismemberment, bounded on the N. by the Baltic Sea from Danzig to Riga, and by the Russian provinces of Riga and Pskov; on the E. by the Russian provinces of Smolensk, Tchernigov, Poltava, and Kherson; on the S. by Bessarabia, Moldavia, and the Carpathian Mountains; and on the W. by the Prussian provinces of Silesia, Brandenburg, and Pomerania. Its greatest length from north to south was 713 English miles; and from east to west, 693 miles, embracing an area of about 282,000 English square miles; an area which, in 1859, had a population of 24,000,000. This extensive tract forms part of the great central European plain, and is crossed by only one range of hills, which springs from the north side of the Carpathians, and runs north-east through the country, forming the water-shed between the Baltic and Black Sea rivers. The soil is mostly a light fertile loam, well adapted for the cereal crops, though here and there occur extensive tracts of sand, heath, and swamp, especially in the eastern districts. Much of the fertile land is permanent pasture, which is of the richest quality; and much is occupied with extensive forests of pine, birch, oak, &c. Rye, wheat, barley, and other cereals, hemp, wood and its products, honey and wax, cattle, sheep, and horses, inexhaustible mines of salt, and a little silver, iron, copper, and lead, constitute the chief natural riches of the country; and for the export of the surplussage of these products, the Vistula, Dnieper, Duna, and their tributaries afford extraordinary facilities.

The kingdom of P., during the period of its greatest extent, after the accession of the grand-duchy of Lithuania in the beginning of the 15th c., was subdivided for purposes of government into about 40 palatinates or voivodies, which were mostly governed by hereditary chiefs. The people were divided into two great classes—nobles and serfs. The noble class, which was the governing and privileged class, included the higher nobles, the inferior nobles (a numerous class, corresponding to the knights, gentry, &c., of other countries), and the clergy, and numbered in all more than 200,000; the serfs were the merchants, tradesmen, and agriculturists, and were attached, not, as in other countries, to masters, but to the soil. The serfs were thus much less liable to ill-usage, and retained more of human energy and dignity than the generality of slaves. The nobles were the proprietors of the soil and appropriated the larger portion of its products; the serfs in many cases receiving only as much as was necessary for the support of themselves and their families. The nobles were chivalrous, high-spirited, hospitable, and patriotic; the serfs, who had also a stake, though a small one, in the independence of the country, were patriotic and good-natured, but sluggish. The present population of the provinces included in the P. of former days, consists of Poles, Lithuanians, Germans, Jews, Russians, Roumanians, gipsies, &c. The Poles, who number 15,600,000, form the bulk of the population; the Lithuanians, 2,100,000 in number, inhabit the north-east of the country; the Germans, of whom there are 2,000,000, live mostly in towns and in villages apart by themselves, and bear the usual character for economy, industry, and that excessive

choice in matters of religion; he was, however, forced into a war with Russia, in which he lost Smolensk; but he was partly compensated by obtaining lordship over Moldavia. His son, Sigismund II., Augustus, was a successor worthy of him. During his reign many abuses were rectified, and the extraordinary privileges of the higher nobles were curtailed or abolished; Lithuania was finally joined indissolubly to P., and from this time there was to be but one diet for the united realm; each retained, however, its own army, titles, treasury, and laws. Lithuania was at the same time reduced by the annexation of Podlachia, Volhynia, and the Ukraine, to Poland. Livonia was conquered from the Knights Sword-bearers (a community similar to, though much less distinguished than the Teutonic Knights); and the power, prosperity, and opulence of the state seemed to guarantee its position as the most powerful state in Eastern Europe for a long time to come. The population almost doubled itself under the two Sigismunds; but this dynasty, whose away was so happy for P., ceased with them; and the warrior class having tasted the sweets of freedom, determined to preserve it by rendering the monarchy elective. The election was made by the two chambers of the diet—viz., the senate or chamber of the chief nobles, and the chamber of nuncios, or representatives of the inferior nobles. He who was chosen king possessed the right of assembling the diet, but had to give a list of the subjects to be discussed; and the representatives, before setting out, were instructed as to the side they were to support. The diet only lasted six weeks, and its decisions were required to be unanimous; so that if the *liberum veto* (the right of forbidding the passing of any measure) were freely exercised even by a single member, all legislation was at a stand-still. The evil effects of these regulations were not so much felt at first, as the members were characterised by honesty and zeal for the general good; but latterly, when venality and subservience to the neighbouring powers began to shew themselves, all the measures necessary for protecting P. from dependence on her neighbours were, by a few corrupt and treacherous representatives, rendered of no avail. The first elective monarch was Henry of Valois (III. [q. v.] of France), who, however, soon abandoned the throne for that of France, and was succeeded by Stephen Bathory (1575–1586), voivode of Transylvania, a man of energy and talent, who carried on war successfully against the Russians, who had attempted to sieze Livonia, pursued them into the very heart of their own country, and compelled the czar to sue for peace; he also subdued the semi-independent Cossacks of the Ukraine, and to some degree introduced civilisation among them. His successor, Sigismund III. (1586–1632), who was succeeded by his sons, Wladislas VI. (1632–1648) and John Casimir (1648–1672), was of the Vasa family, and was the crown-prince of Sweden; but his election, far from cementing a bond of union between the two countries, only embittered former dissensions. These three Swedish monarchs were most unworthy successors to P.'s ablest king, as they had neither talents for governing, nor characters and sentiments congenial to a warlike nation; on the contrary, their policy was weak, tortuous, and vacillating. Yet they were always quarrelling with their neighbours, declaring war with Russia, Sweden, or Turkey, in the most imprudent and reckless manner, and often without valid pretext. But the Polish armies, though as little fostered and cared for as the other portions of the nation, were everywhere victorious; the Swedish and Muscovite armies were successively annihilated; Moscow was taken, and the Russians reduced to such an abject condition, that they

offered to make Sigismund's son, Wladislas, their czar. Sweden made a similar offer to another son of the Polish monarch; but the latter's absurd behaviour lost for P. this rich result of her great victories; and the foolish policy of the whole three not only rendered fruitless all the lavish expenditure of Polish blood and treasure, but lost to the country many of her richest provinces, and left her without a single ally; while their religious bigotry commenced that reign of intolerance and mutual persecution between the various sects which was the immediate cause of P.'s downfall. To shew the power of the Poles at this period, it will be sufficient to notice that Great P., Little P. (Galicia, Podolia, Ukraine, &c.), Livonia, Lithuania (including Samogitia and Black and White Russia, Polesia, and Tchernigov), Pomerelia and Ermeland, Courland, Moldavia, Bukovina, Walachia, Bessarabia, and Prussia, were either integral parts of the Polish monarchy, or were subject to it. The imprudent attempts of the Swedish sovereigns to amend the constitution only excited the suspicion of the nobles, and led to a further curtailment of royal authority. During the reign of this dynasty, Walachia and Moldavia were snatched by the Turks from under the Polish protectorate; Livonia with Riga was conquered (1605–1621), along with part of Prussia (1629), by Sweden; and Brandenburg established itself in complete independence. The Cossacks, who had been goaded almost to madness by the most atrocious oppression and religious persecution, rose in rebellion to a man, put themselves under the protection of Russia, and ever afterwards proved themselves the most inveterate enemies of the Poles. In the reign of John Casimir, P. was attacked simultaneously by Russia, Sweden, Brandenburg (the germ of the present kingdom of Prussia), the Transylvanians, and the Cossacks; the country was entirely overrun; Warsaw, Wilna, and Lemberg taken; and the king compelled to flee to Silesia. But the celebrated staff of Polish generals was not yet extinct; Czarniecki's sword was as the breath of the destroying angel to P.'s enemies; and after being defeated in detail, they were ignominiously expelled from the country. But in the subsequent treaties, Ducal or East Prussia was wholly given up to Brandenburg; almost all Livonia to Sweden; and Smolensk, Severia or Tchernigov, and the Ukraine beyond the Dnieper, were given to Russia. Michael Wisniowiecki (1668–1674), the son of one of the group of famous generals above alluded to, but himself an imbecile, was (contrary to his own wish [for he was well aware of his own deficiencies]) elected as their next monarch; a war with Turkey, concluded by an ignominious peace, was the chief event of his reign. But the senate rejected the shameful treaty, the Polish army was again reinforced, the Polish monarch resigned the command to John Sobieski the Hetman (q. v.), and the Turks were routed with great slaughter at Choczim (1673). After some dissensions concerning the election of a successor, John (q. v.) Sobieski (1674–1696) was chosen; but his reign, though it crowned the Poles with abundance of the laurel wreaths of victory, was productive of no good to the internal administration. As Sobieski's successor, the Prince of Conti was legally elected, and proclaimed king; but the cabinet of Versailles allowed this splendid opportunity of becoming supreme in Europe to escape; and Augustus II. of Saxony, a protégé of the House of Austria, entered P. at the head of a Saxon army, and succeeded in obtaining the throne. Augustus, unlike all his predecessors, never seemed to identify his interests with those of his Polish subjects; and though he gained their hearts by promising to

POLAND.

by the treaty of Tilsit (1807), of the *Duchy of Warsaw*, chiefly out of the Prussian share of P., with a liberal constitution, and the Elector of Saxony as its head. The duchy was an energetic little state, and, under the guidance of Prince Joseph Poniatowski, wrenched Western Galicia from Austria (1809), at the same time furnishing a numerous and much-valued contingent to the French armies; but the advance of the grand allied army in 1813 put an end to its existence. After the cessions by Austria in 1809, the duchy contained 58,290 English square miles, with a population of about 4,000,000. Danzig was also declared a republic, but returned to Prussia (February 3, 1814).

The division of P. was re-arranged by the Congress of Vienna in 1815, the original shares of Prussia and Austria were diminished, and that part of the duchy of Warsaw, which was not restored to Prussia and Austria, was united as the *kingdom of P.* (see next article) to the Russian empire, but merely by the bond of a personal union (the same monarch being the sovereign of each), the two states being wholly independent of and unconnected with each other; and the other parts of P. were completely incorporated with the kingdoms which had seized them. The partition of P., as thus finally arranged, was as follows:

Extent in Eng. sq. Miles.		Pop. (in 1860.)	Present Political Divisions.
Russia,	220,500	16,000,000	Provinces of Courland, Witebsk, Kovno, Vilna, Grodno, Minsk, Mohilev,
Prussia,	26,000	3,000,000	Volhynia, Kiev, Podolia; and the kingdom of Poland (q. v.).
Austria,	35,500	5,000,000	Posen, most of W. Prussia, and several districts in E. Prussia.
			Galicia, Bukovina, Zips, &c.

while, as if in mockery of its spirit of independence, the town of Cracow, with a small surrounding territory, was declared free and independent, under the guardianship of Austria. The czar at first gave a liberal constitution, including biennial diets, a responsible ministry, an independent judiciary, a separate standing army, and liberty of the press; and he seemed to take pride in his title of king of P.; but his brother Constantine, having been appointed military governor, speedily put an end to the harmony between the czar and the Poles, and drove the latter into insurrection. Their discontent at first found vent in secret societies; but on November 30, 1830, Constantine and his Russians were driven out of Warsaw, and a general insurrection of the people, headed by the aristocracy, took place. Prince Czartoryski was appointed president of the provisional government, and military leaders, as Radzivil, Dembinski, Bem, &c., were soon found; but a general want of energy in the administration, dilatoriness on the part of the military leaders, and the checking of the spread of the insurrection till fruitless negotiations had been entered into with Nicholas, were errors fatal to the success of the Poles. From January 1831 till September 8th of the same year, a series of bloody conflicts were fought, in which the Prussians and Austrians, with pitiable subservience, aided the czar. At first, the Poles were successful; but the taking of the capital by Paskievitch (q. v.) soon ended the war, which was followed, as a matter of course, by imprisonment, banishment, confiscation, and enforced service in the Russian army. From this time, the independence of P. was suppressed, and in 1832 it was declared to be an integral part of the Russian empire, with a separate administration headed by a viceroy of the czar's choosing; the constitution and laws were abrogated; strict censorship of the press and the Russian spy police-system established in all its vigour; the country was robbed of its rich literary collections and works of art; and the most severe and arbitrary measures taken to Russianise the people. The outbreaks of 1833 and 1846 were punished by the gallows. Simultaneous disturbances (1846) in the Prussian and Austrian portions of P. were summarily suppressed; their leaders in Prussia were imprisoned, and only saved from death by the revolution of March 1848 at Berlin; and those in Austria were butchered by the peasantry, who preferred the Austrian to a national government. On the 6th of November 1846 the republic of Cracow was incorporated with Austria. After the accession of the Czar Alexander II. in 1855, the condition of the Poles was considerably ameliorated; an act of amnesty brought back many of the

expatriated Poles, and various other reforms were hoped for, when, in 1861, another insurrection broke out. Its origin is curious, and gives a thorough insight into the relations between the Poles and their Russian rulers. A large multitude (30,000) had assembled in the neighbourhood of the battle-field of Grochow (where two battles had been fought in the spring of 1831), to pray for the souls of those who had fallen; they were engaged in prayer and in singing religious chants, when they were charged by the Russian cavalry and gens d'armes, several of them killed, and numerous arrests made. This event excited intense national feeling throughout the country; and other national demonstrations, attended with similar massacres on the part of the Russians, produced such an intense dislike to the latter, that most of the Poles in the Russian service either resigned or deserted. The Russians immediately had recourse to the most severely repressive measures, forbidding all assemblies even in the churches, punishing those who appeared to mourn the death of relatives killed in the previous massacres, or who wore garments of certain shapes or colours. The application of the Polish nation to the czar (February 23) for the re-establishment of the Polish nationality, was rejected, but certain necessary reforms were promised. These reforms were on the whole very liberal, and tended greatly to allay the general excitement; but the Russian government was very naturally not trusted by the Poles, and new disturbances broke out in October of the same year. P. was then declared to be in a state of siege, and General Luders appointed military commandant under the Grand Duke Constantine, the nephew of the Grand Duke Constantine above mentioned. The country continued in a state of commotion without any very decided outbreak; attempts were made to assassinate the Grand Duke and the other Russian officials; and on January 13, 1863, Lithuania and Volhynia were also put in a state of siege. The Committee of the National Insurrection issued its first proclamation in February 1863; and a week afterwards, Mieroslavski raised the standard of insurrection in the north-west, on the Posen frontier. The Insurrection Committee continued to guide the revolt by issuing proclamations from time to time; and many districts of Augustovo, Radom, Lublin, Volhynia, and Lithuania, were speedily in insurrection. It was a mere guerrilla war, and no great or decisive conflicts took place; but the sympathy of Europe was largely enlisted on behalf of the Poles. Remonstrances from Spain, Sweden, Austria, France, and Britain conjointly and repeatedly, Italy, the Low Countries, Denmark, and Portugal, were wholly disregarded by the czar's ministers,

not resumed; but the extraordinary zeal in the cause of naval discovery which sprung up in the beginning of George III.'s reign, produced two renewed efforts. The first of these was made in the spring of 1773 by an expedition, consisting of two vessels, under Captain John Phipps (afterwards Lord Mulgrave), and fitted out by the Admiralty purely for scientific purposes. Phipps sailed along the shore of Spitzbergen till he was stopped by the ice at Cloven Cliff; he then coasted backwards and forwards along the ice-field for nearly a month, trying the various narrow openings, some of which were two leagues in depth, till he found one which took him into open water. By a sudden change in the climate, he was frozen in, and only extricated his ships after severe labour. The highest point to which he reached was lat. $80^{\circ} 48' N.$, less by 49 miles than the most northerly latitude attained by Hudson; and though he had a more than usual amount of difficulties to encounter, yet his failure, along with that of Captain Cook, who attempted to reach the pole by Behring's Strait, but only penetrated to lat. $70^{\circ} 45' N.$, greatly disheartened other explorers. The offer of £5000 by the British parliament to the crew that should penetrate to within 1° of the pole, awakened no competition; but in 1806, Mr Scoresby, then mate of a Greenland whaler from Hull, reached a point directly north of Spitzbergen, in lat. $81^{\circ} 30' N.$, and therefore only about 510 geographical miles from the pole. In following expeditions, the same enterprising navigator made many geographical explorations of Jan Mayen's land and the east coast of Greenland, largely adding to our knowledge of the character and products of the arctic regions. The subsequent expeditions of Buchan and Franklin in 1818, of Clavering in 1823, of Graab (Danish) in 1828, of De Blotseville (French) in 1833, may be considered as failures, as far as geographical discovery is concerned; for, omitting the French expedition, the fate of which is still involved in mystery, none of them reached so high latitudes as the previous English expeditions. After the failure of Buchan and Franklin's expedition, the impossibility of ever reaching the pole was generally accepted in this country as fact; but Mr Scoresby, in a Memoir which he communicated to the Wernerian Society, endeavoured to prove that this supposed impossibility was by no means such; in fact, that a journey to the pole could be made without any enormous amount either of difficulty or danger. The principal obstacle to be encountered being the alternation of ice-fields and water, which prevented all advance either by ships or sledges, Mr Scoresby proposed the use of a vehicle which could be used either as a sledge or boat, and recommended a team of dogs to draw it, they being lighter (for conveyance by water, and for travelling over thin ice) and more tractable than reindeer. After some time, this suggestion began to receive a considerable share of attention, and Captain Parry (celebrated for his discoveries in the polar seas north of America) was put in command of an expedition fitted out in accordance with Scoresby's plans. He sailed from England in the *Hecla*, on March 27, 1827; but it was the 22d of June before the exploring party quitted the ship, which was left on the north shore of Spitzbergen, in charge of a small crew, and betook themselves to the boats; and in spite of the advanced season of the year, they in the first two days advanced to $81^{\circ} 13'$. Here they began to encounter many difficulties; the ice-fields were small, and near each other, necessitating a constant conversion of the vehicle from a sledge to a boat, which could not be effected without unloading it, an operation

which consumed much time. This hardship, however, was endurable; but, to Parry's intense chagrin, he discovered, about the 22d of July, that the ice over which they were travelling was moving southward as rapidly as they were advancing north, so that on the 24th, after having travelled apparently 22 miles in the three previous days, they found themselves in the same latitude as on the 21st. Under these circumstances, Parry resolved to return, which he accordingly did, reaching his ship on the 21st of August. The highest point reached by him was $82^{\circ} 40'$. This was the first and last attempt to reach the pole over the ice; and though it can in no way be considered as finally settling the question of the possibility of reaching the pole in this way, it has shewn that the only way to success is that which was followed by the north-west passage explorers, who suffered themselves to be frozen in during winter, in order that they might have so much more time in the following summer for further advance, and continued this system for two or three successive years. The failure of Parry's expedition has also suggested further improvements in the arrangements for food, clothing, and transport across the ice-fields, which will be found serviceable in case of a second attempt. In 1854, two American explorers passed through Smith's Sound, and reached Cape Constitution in $82^{\circ} 27' N.$ lat., and saw north of this point a boundless open polar sea, teeming with animal life, which has not yet been explored.

Antarctic Expeditions.—The attempts to penetrate to the south pole are of very recent date, mainly because a knowledge of the southern polar regions is only valuable to Europeans from a scientific point of view. Cook and Furneaux are the first navigators who are known to have crossed the Antarctic Circle, but the former penetrated only to lat. $71^{\circ} 10' S.$, and neither made any discoveries of importance. Bellinghausen, a Russian navigator, reached lat. $70^{\circ} S.$ in 1819, and two years after, discovered Alexander's Land and Peter's Land, then the most southerly islands known. In 1823, Captain Weddell reached lat. $74^{\circ} 15' S.$, long. $34^{\circ} 16' W.$, and saw beyond him an open sea to the south, but made no important additions to our geographical knowledge. In 1831, Captain John Biscoe discovered Enderby Land; and in 1839, the sealing-schooner, *Eliza Scott*, from New Zealand, discovered Sabrina Land (q. v.); and in the same year, the United States' expedition, under Captain Wilkes, set out on a career of exploration, which resulted in the discovery (January 1840) of what he with reason supposed to be a continuous coast-line, though an ice-line of from 8 to 12 miles in width prevented him from establishing its continuity beyond dispute. The (supposed continental) coast stretched from Ringold's Knoll on the east, to Enderby Land on the west, and was distinguished by the absence of currents to disturb the ice-barrier, and by a much less precipitous character than belongs to islands. In 1840, a French expedition, under D'Urville, discovered a line of coast lying directly south from Victoria (Australia) to the Antarctic Circle. But the most important discoveries of all were achieved by Captain (afterwards Sir James) Clarke Ross, who made three several voyages in 1841—1843, discovering Victoria Land (q. v.), and tracing its coast from lat. 71° to lat. $78^{\circ} 10'$ (the highest southern latitude ever attained). In his third voyage, Ross proved that the lands discovered by D'Urville were islands of inconsiderable magnitude; and his antarctic expedition has besides supplied much important information to the students of natural history, geology, and above all of Magnetism (q. v.). Ross's geographical

POLARISATION OF LIGHT.

planation of the ordinary experimental results. To explain the nature of this difficulty, we merely mention the simple case of polarisation by reflection at a glass plate. Do the vibrations of the reflected ray take place *perpendicular* to the plane of reflection (i. e., parallel to the reflecting surface), or do they take place in the plane of reflection? Some high authorities are in favour of the latter hypothesis, but the general opinion of scientific men at present unquestionably leans to the former. Many delicate experiments have been made to decide the question, but their results have been irreconcilable with each other. From the results which we have just arrived at, it is evident that the oscillations, or vibrations of the luminiferous medium, of which light consists, are similar to those of the bob of a Pendulum (q. v.), the ray in this case being supposed to proceed vertically downwards. Polarised light consists of vibrations analogous to those of the ordinary pendulum, backward and forward in a line. But we have seen that any motion of the pendulum may be compounded of two such motions in planes perpendicular to each other. This is analogous to the decomposition of common light by a doubly-refracting crystal into two rays polarised at right angles. But we find in nature, and can produce artificially, motions of the luminiferous medium resembling exactly the elliptic, and circular, motions of the (conical) pendulum. They occur in nature in all cases of reflection from metallic surfaces, and also from the surfaces of highly refractive bodies, such as diamond, &c. The easiest artificial method

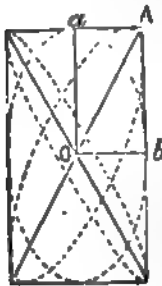


Fig. 1.

of procuring them is to allow polarised light to pass through a thin plate of a doubly-refracting crystal, such as a film of mica. Thus, if *Oa* be the direction of vibration of the polarised light, the ray moving perpendicularly to the paper, *Oa*, *Ob*, the directions (at right angles to each other) of vibration of the two rays into which it is divided by the mica, we have only to let fall from *A* perpendiculars on *Oa* and *Ob* to determine the extent of the resolved vibrations in these directions. Now if the two rays moved equally rapidly through the mica, they would simply recombine on leaving it into a single plane polarised ray, whose vibrations would be represented by *Oa* as before. But, in general, one of the rays is retarded more than the other, and the combination of two such oscillations is seen by geometrical considerations to give an ellipse whose centre is at *O*, and which touches each side of the rectangle of which *Aa* and *Ab* are half sides. The limiting forms of these ellipses are, of course, the diagonals of the rectangle; so that there are two cases for the light remaining plane polarised after passing through the mica, for an infinite number in which it will be elliptically polarised. Also the difference of retardation of the two rays may be such as to correspond to a description of these ellipses either right-handedly or the opposite. In particular cases the ellipse may be a circle; then it is obvious that the rectangle must become a square, that the directions of vibration of the two rays in the mica must be equally inclined to that of the original polarised ray, and that one ray must be retarded an odd number of quarter oscillations more than the other. If it be 1, 5, 9, &c., quarter oscillations, the rotation is in one direction; if 3, 7, 11, &c., it is in the opposite. Circularly polarised light cannot be distinguished by the eye, even with the

help of a Nicol's prism, from common light; but by the interposition of a thin plate of a doubly-refracting crystal, phenomena are produced which common light cannot give. Before we leave this part of the subject, it may be remarked that the composition of two equal and opposite circular vibrations produces a plane vibration, whose plane depends upon the simultaneous positions of the revolving bodies in their circular orbits. Hence a plane polarised ray may always be considered as made up of two circularly polarised rays, and if these pass through a medium which retards one more than the other, the plane of polarisation of their resultant, when they leave the medium, will in general not be the same as that of the incident ray. In other words, the plane of polarisation will have been caused to rotate through a certain angle, which will be proportional to the difference of retardation of its circular components. This is the explanation of what is called *Rotatory Polarisation* in quartz, turpentine, sugar, &c., and of the rotation of the plane of polarisation discovered by Faraday when a polarised ray passes through a transparent body under the action of a magnet.

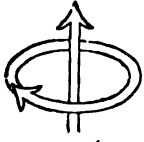
In the first of these cases, the retardation is due to molecular heterogeneity; in the second, it depends upon molecular motions produced by the magnet. The effect is greater in each case the more refrangible the rays; and therefore, when the light which has passed through the medium is examined with an analyser, the successive colours of the spectrum are cut off each at a different angle, and the observed tint is that compounded of those which remain. The Saccharimeter (q. v.), for the determination of sugar in a liquid, is an application of the first case; the second has not as yet been applied to any practical purpose, but it has given most valuable information as to the ultimate nature of magnetism.

When polarised light passes through a slice of any uniaxial double-refracting crystal, nearly in the direction of its axis, it is obvious that the difference of retardation of the two rays into which it is divided will depend only upon (1) their refrangibility and (2) their inclination to the axis of the crystal. Hence, if we suppose the light to be homogeneous, the effects of interference, and subsequent application of the analyser, must be to produce appearances of bright and dark spaces, symmetrically disposed round the axis; that is, a series of concentric circular rings. The superposition of the separate sets of rings, for each colour of the spectrum, produces the appearance actually observed; a series of coloured rings, like those known as Newton's Rings, due to Interference (q. v.). Besides these, however, there is a dark or bright cross, consisting of two

Fig. 2.—Uniaxial Crystal; Black Cross.

black or white bands, intersecting each other in the common centre of the rings. The dark bands are

bodies exactly as a small magnet would whose axis is, as in the cut, perpendicular to its plane, the arrow-head representing the *north* pole; that is, the pole which turns towards the *South*. Again, an electric current passing in a straight wire would at first sight appear to be altogether independent of polarity; yet it is found that such a current moving in



the straight line in the cut, in the direction of the arrow-head, tends to make the *north* pole of a magnet rotate round it in the direction indicated by the arrow-head in the circle. Again, there are certain crystals, which, when heated, become electric. One end of a prism of tourmaline, for instance, takes positive, the other negative electricity. Also certain crystals of quartz cause a ray of Polarised Light, which passes along their axis, to rotate right-handedly; others left-handedly. The difference in these cases is due to molecular arrangement, other effects of which are easily seen in the tourmaline, in the dissymmetry of the two terminals of the prism, and, in quartz, in the position of certain small faces of the crystal, so that a preliminary inspection enables us to predict the direction of the effect to be obtained from any particular specimen. The term has various other applications, amongst the least defensible of which is that to light. See POLARISATION.

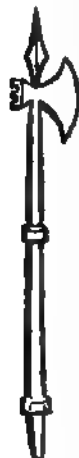
POLDER, a word of frequent occurrence in the topography of the Netherlands, is the name given to a piece of land below the level of the sea or nearest river, which, being originally a morass or lake, has been drained and brought under cultivation. The usual mode of procedure is to form an embankment and canal of sufficient height to command a run towards the sea or a river, and when carried quite round, as in the case of the Haarlem Lake, the canal girdle is called the Ringvaart. At one or more points along the embankment, apparatus for lifting water, such as the screw of Archimedes, the inclined scoop or Eckharit wheel, or pumps of large diameter, is placed, and worked by wind or steam-power. If the lake deepens towards the centre, it is necessary to have several embankments and canals, the one within the other. These are formed, at different levels, as the water-surface becomes lessened, connection being maintained on to the outer canal, which secures a run for the water which is drained off. In the Schermermeer polder, North Holland, there are four levels of canals, the land between them forming long parallelograms. The drainage water of the inner space is lifted into the first canal; that, again, with the drainage of the second section, is thrown into the second canal; and so on until the exterior one is reached, and a fall obtained. The polders in the Netherlands are so numerous, that we can only mention a few of the most important. The Beemster, one of the richest districts of North Holland, until 1612 a sheet of water, is crossed at right angles by long shady avenues, and dotted with comfortable farmhouses and fruitful orchards. In 1863 the pop. amounted to 3589, possessing 5885 head of horned cattle, 21,135 sheep, &c. The Zype, the Schermer, and the Purner are also fine polders, but the most recent and striking instance is the drained Haarlem Lake (q. v.). The 50,000 acres of land thus obtained, supported, in 1863, a population of 7825, possessing 2336 horses, 7661 head of horned cattle, 13,807 sheep, &c.

POLE, CARDINAL REGINALD, born in Staffordshire in the year 1500, was the son of Sir Richard Pole, Lord Montacute, by Margaret, Countess of

Salisbury, daughter of the Duke of Clarence, the brother of Edward IV. His early education was received from the Carthusians at Sheen, whence, being liberally provided for by the king his relative, he passed to Magdalen College, Oxford, and having received deacon's orders, was advanced to several valuable preferments, through the favour of the king, Henry VIII. For the further prosecution of his studies, he went to the university of Paris, and thence to Padua, where he formed the friendship of a distinguished group of scholars and friends, all of whom subsequently took a leading part in public affairs—Contareni, Bembo, Sadoletto, and others. In 1525, he returned to England, where the highest ecclesiastical dignities awaited his acceptance. But it was about this time that Henry had resolved upon the divorce from his queen Catharine, and P. not only withheld his assistance in carrying out the project, but provoked the undying resentment of the king by his well-known treatise, *De Unitate Ecclesiastica*. His preferments and pension were withdrawn, and preparations were made for his impeachment. This, and probably still more extreme measures, he evaded by withdrawing from England. The king's resentment fell instead upon his elder brother, and upon his aged mother, the Countess of Salisbury. During the rest of Henry's reign, P. remained in exile. The pope, for the maintenance of whose authority, in the cause of the injured Catharine, P. was regarded as a martyr, treated him with distinguished favour, and elevated him to the cardinalate. He was employed in many affairs of the highest importance, being sent as legate, in 1537, to France and the Low Countries, from both which states Henry VIII. in vain demanded his extradition. He also took an active part in the discussions on the Interim; and when the Council of Trent was opened, he was appointed one of the three legate-presidents who acted in the name of the pope, Paul III. (q. v.). On this pontiff's death in 1549, P. was all but elected to succeed. For some time after Paul's death, he resided chiefly in a monastery near Verona, in comparative retirement, until the accession of Mary called him back to active life, as the main instrument of the reconciliation of England with the papacy. On November 24, 1554, P. solemnly entered London as legate and plenipotentiary of the Roman see, possessing in an equal degree the confidence of the queen. In the arduous charge thus intrusted to him, he acquitted himself with much prudence, and, considering the circumstances of the time, with singular moderation. In the religious or politico-religious severities which marked the later history of Mary's reign, it is all but certain that P. had no share. He was created Archbishop of Canterbury, and Chancellor of the universities of Oxford and Cambridge. On the difficult and critical question of the disposal of the church property confiscated in the former reign, P., who saw the necessity of moderation, was for a time at issue with the pope; but his representations were successful in producing a more moderate policy, and the work of reunion appeared to proceed with every prospect of a complete permanent issue, when it was interrupted by the death of the queen in 1558. P. died within less than twenty-four hours afterwards. Besides the treatise *De Unitate*, already mentioned, he is also the author of a book *De Concilio*, and of other treatises on the authority of the Roman pontiff and the Reformation of England, and of very many most important letters, full of interest for the history of the time.

POLEAXE, a weapon consisting of an axe-head mounted on a long pole. There were many varieties of this arm, passing from a great hand-axe to an

axe-headed spear or halbert, several of the longer sorts bearing but little resemblance to an axe. In the navy, a poleaxe or boarding-hatchet is a hatchet with a handle about fifteen inches long, and a sharp point hending downwards at the back opposite the blade. It is used for boarding or resisting boarders.



Poleaxe.

POLECAT, or FITCHET (*Mustela putorius*, or *Putorius fœtidus*), a quadruped of the Weasel family (*Mustelidae*), and commonly referred to the same genus with the weasel, stoat or ermine, &c. It is the largest British species of that genus, the length of the head and body being about a foot and a half, the length of the tail more than five inches, the form stouter than that of the weasel or of the ermine. Its colour is a deep blackish brown; the head, tail, and feet almost black, the under parts yellowish, the ears edged with white, and a whitish space round the muzzle. The hair is of two kinds—a short woolly fur, which is pale yellow, or somewhat tawny; and long shining hairs of a rich black or brownish-black colour, which are most numerous

on the darkest parts. The nose is sharp, the ears short and round, the tail pretty equally covered with longish hair. There is a pouch or follicle under the tail, which exudes a yellowish, creamy substance of a very fetid odour; and this odour is particularly strong when the animal is irritated or alarmed. Hence, apparently, its name *Foumart* (*Foul Marten*), which, with various provincial

which grow through the lighter-coloured fur of the animal.—The Ferret (q. v.) is supposed by some to be a mere variety of the polecat.—A dark-coloured kind of ferret is commonly regarded as a cross between the P. and the ferret, and is sometimes called the *Polecat-ferret*. The P. breeds in May or June, making its nest in an old rabbit burrow or similar hole, and producing four, five, or six young.—In North America, the Skunk (q. v.) is called polecat.

POLEMONIACEÆ, a natural order of exogenous plants, allied to *Convolvulaceæ*, and containing more than 100 known species, natives of temperate countries, and particularly abundant in the north-western parts of America. They are mostly herbaceous plants, with alternate and often pinnated leaves; regular hermaphrodite flowers; 5-cleft calyx; 5-lobed corolla; 5 stamens, springing from the tube of the corolla; the ovary free, surrounded with a fleshy disc; the style surmounted by a 3-cleft stigma; the fruit a capsule with 3 cells, and 3 valves; the seeds often enveloped in mucous, which contains spiral threads. Some of the species are favourite garden flowers, as *Polemonium ceruleum*, *Cobæa scandens*, and species of *Phlox*, *Ipomopsis*, *Gilia*, &c. None are of value otherwise. *Polemonium ceruleum*, the only British species, and a rare plant in Britain, is well known in gardens by the curious name of *Jacob's Ladder*. It is also called *Greek Valerian*. It is not supposed to be really the *Polemonium* of the ancients, to which great medicinal virtues were ascribed by them. It has a stem from one to two feet high, pinnate leaves, and a panicle of blue (or white) flowers.

POLENTA, a preparation of Semolina (q. v.) or of Indian corn or maize meal, which is used as food by all classes in Italy. By the poorer classes, maize is universally used. The material is mixed with milk or water, and boiled until it is just thick enough to pour out into a dish, in which it becomes as firm as a thick jelly. Cheese is grated over it, and other condiments are added according to taste, and it is cut out in slices, and either eaten at once, or sometimes the slices are lightly fried in oil or butter. Semolina being much more expensive, is only used by the wealthier people, and many ingredients are added to suit their tastes.

POLE-STAR, or POLARIS, the nearest conspicuous star to the north pole of the celestial equator. The star which at the present time goes under the name of the 'pole-star' is the star α in the constellation of Ursa Minor. By examining attentively the general movement of the stars throughout a clear winter's night, we observe that they describe circles which are largest at the equator, and become smaller and smaller as we approach a certain point (the north pole of the celestial equator), close to which is the star above mentioned. This 'pole-star' is, however, a little less than $1\frac{1}{4}^{\circ}$ from the pole, and has a small but sensible motion round it. See *POLARIS*. Owing to the motion of the pole of the celestial equator round that of the ecliptic (see *PRECESSION OF THE EQUINOXES*), this star will in course of time (about 2100 A.D.) approach to within $28'$ from the north pole, and will then recede from it. At the time of Hipparchus (150 B.C.), it was $12'$; and in 1785, $2^{\circ} 2'$ from the north pole. Its place can easily be found in the heavens, for a line drawn between the stars α and β (called the two *pointers*, from this peculiarity) of the constellation Ursa Major, or the Great Bear, and produced northwards for about $4\frac{1}{2}$ times its own length, will almost touch the pole-star. Two thousand years ago, the star β of Ursa Major was the pole-star; and about 2300 years before the

Polecat (*Mustela putorius*).

modifications, as *Fulmart*, *Thoumart*, &c., is prevalent in most parts of Britain. The origin of the names P. and Fitchet is much more uncertain.

The P. was much more common in Britain in former times than now, and is almost extirpated from some districts, through the constant war waged against it by gamekeepers and others. It eats everything that the gamekeeper wishes to preserve. It is extremely destructive in the poultry-yard, the abundance present there inviting it to drink blood and eat brains, which seem to be its favourite luxuries. The rabbit is followed by the P. into its burrow, and its ravages among poultry are partly compensated by its destruction of rats.—The taming of the P. does not seem to have been attempted. The smell prevents it.—The skin is imported from the north of Europe under the name of *Fitch*, and is used as a kind of fur, similar but inferior to that of the Marten (q. v.). It is imported to some extent from the north of Europe. To artists, the hair of the *fitch* or *fitchet* is well known as that of which their best brushes are made; the hairs used for this purpose being the long hairs already noticed,

Christian era, the star α in the constellation of the Dragon was not more than $10'$ from the north pole; while 12,000 years after the present time, the bright star Vega in Lyra will be within $5'$ of it.

The south pole of the celestial equator is not similarly marked by the near neighbourhood of a bright star, the only star deserving the name of the south pole-star being of the sixth or least visible magnitude.

POLES (Gr. *polos*, a turning-point), in *Geography*, are the two extremities of the axis round which the earth revolves; they are therefore situated the one on the north, and the other on the south side of the equator, and equidistant from all parts of it, or in lat. 90° N. and lat. 90° S. They are called the north and south poles of the earth.—In *Astronomy*, the poles, which, for distinction's sake, are frequently denominated 'celestial poles,' are those points in the heavens to which the earth's axis is directed, and round which the heavens seem to revolve. The celestial poles are valuable points of reference to astronomers and geographers, so that the determination of their position in the heavens is a matter of the utmost importance. Unfortunately, no stars mark their exact situation (see **POLE-STAR**)—though there is a minute telescopic star only a few seconds from the north pole, which may be employed instead of it in rough observations—and therefore it is necessary to adopt some means for discovering its precise position. This is effected in the following manner: A bright star (generally the pole-star) is selected, and its position in its upper and its lower *Culminations* (q. v.) is accurately noted; the point midway between these two positions of the star is the pole of the heavens. The observation of the star's two positions must be corrected for refraction, and it is for this reason that the pole-star is selected, since the effect of refraction is much the same in both positions of the star. The term 'poles' has, however, a wider application, as denoting the extremities of a line passing through the centre of a great circle perpendicular to its plane; thus, we have the poles of the horizon (viz, the zenith and nadir), the poles of the ecliptic, the poles of a meridian; and in the same sense, the terrestrial and celestial poles are spoken of as the poles of the equator and equinoctial respectively.—**Pole**, in *Geometry*, is used in a very indefinite sense; and in *Physics*, it denotes those points of a body at which its attractive or repulsive energy is concentrated. See **POLARITY**.

POLIA'NTHESES. See **TUBEROSE**.

POLICE (Lat. *politia*, Gr. *politia*, civil government; from *polis*, a city), are constables or peace-officers appointed in all parts of town and country for the purpose of watching property and detecting crime, and arresting offenders and maintaining public order. Though the word policeman is now, especially in towns, a household word, the legal denomination is that of constable; but he is a paid constable, to distinguish him from unpaid constables and special constables. In each parish in England, the justices of the peace have power to appoint constables to act gratuitously and compulsorily; but the vestry has power to resolve that one or more paid constables shall be appointed, in which case the justices are to make the appointment, and these paid constables supersede the unpaid constables. The salary of these parish constables is paid out of the poor-rates of the parish by the overseers. The justices also appoint a superintendent constable for each petty sessional division, to settle the fees and allowances which are to be paid to the constables for the service of summonses, and for the execution of

warrants incidental to the office of justices of the peace. In all boroughs in England, the corporation is empowered, by the Municipal Corporation Acts, to appoint a watch committee, who appoint a sufficient number of men to act as constables. The treasurer of the borough pays their salaries, wages, and allowances, as well as extraordinary expenses incurred by them. By a recent act applicable to counties, the justices are empowered to establish a sufficient police force for each county, and a chief constable is appointed to govern the whole.

The duties of constables or police-officers are exceedingly multifarious, and they receive printed regulations to guide them in the proper discharge of such duties. They have important duties in reference to the apprehension of offenders, and their powers are necessarily larger than those of private individuals. Wherever a person is seen in the act of committing a felony, it is the duty of every one, not merely of constables, to apprehend him or her without any warrant, for no warrant is needed. Persons found offending in many misdemeanours may also be apprehended by anybody without a warrant; but in other cases, a constable only can make an arrest. In case of a riot, anybody may arrest the rioter. Constables are bound to arrest hawkers trading without a licence; and vagrants who are offending against the Vagrant Acts, such as telling fortunes, loitering about premises, &c. The powers of constables are much greater than those of individuals with reference to crimes after they are committed. Thus, where the constable has not seen the offence committed, but is merely told of the fact, and he has reason to believe it, he is entitled to arrest the party charged without any warrant; he must, however, in such cases act only on reasonable suspicion. He is not justified, for example, in apprehending a person as a receiver of stolen goods on the mere assertion of the principal felon; nor is a constable justified in taking a person into custody for a mere assault without a warrant, unless he himself was present at the time the assault was committed, or reasonably apprehends a renewal of it. If a constable have a reasonable suspicion that a man has committed a felony, he may apprehend him; and so a private individual may do so. The difference between the authority of the constable and the private person in this respect is, that the latter is justified only in case it turn out that a felony was in fact committed; but the constable may justify the arrest and detention whether a felony was committed or not. It is the duty of a constable to raise a hue and cry in search of a felon, and all private individuals are bound to join in it, otherwise they may be indicted and fined. An arrest by a constable is usually made by laying hands on the party, and detaining him; but it is enough for the constable to touch him and say: 'I arrest you, in the Queen's name.' If the party arrested be in a house in hiding, the constable may demand admittance, and if he is refused, may then break open the doors; this is so in all cases where the party has committed treason or felony, or has dangerously wounded another. In cases where the constable is not authorised at common law or by some statute to arrest a party without a warrant, then he must produce a warrant signed by a justice of the peace, and shew it to the party if it is demanded; and if the constable happens not to have the warrant in his pocket at the time, even though it is not asked for, it is an illegal arrest. When a party is arrested, it is the duty of the constable to take him without any unreasonable delay before a justice of the peace, and meanwhile lodge him in safe custody. The party arrested must not be treated with harshness beyond what

even able performance. In 1702—after a stroke of his usual neat flattery—he was recalled to Versailles, and rose higher into favour than ever. Named *Auditeur de Rote* in 1706, he was sent to Rome, where he devoted himself to the study of canon and civil law, was associated in the negotiations of Cardinal de la Trémouille, and honoured with the friendship of Pope Clement XI. In 1712, he was appointed French plenipotentiary at the Congress of Utrecht; and after his return, obtained the abbey of Corbie and Anchin. When Louis XIV. died, P. was at the top of his reputation and influence. During the regency of the Duke of Orleans, he took part in the conspiracy of Cellamare, and was banished to his abbey of Anchin. In 1720, he was sent to Rome, charged with the conduct of French affairs, and remained here for about ten years, and signalled his mission by healing the quarrel that was dividing the Gallican Church on the subject of the famous bull *Unigenitus*. In 1726, he was raised, in his absence, to the archbishopric of Auch; and on his return to France, spent the remainder of his days in literary repose, and in the high esteem of courtiers, scholars, and the like. He died 3d April 1742. P. succeeded Bossuet at the Académie Française in 1704, and became an honorary member of the *Académie des Sciences* (1715) and of the *Académie des Belles-lettres* (1717). See C. Faucher's *Histoire du Cardinal de Polignac* (2 vols., Paris, 1772), St Simon's *Memoires*, and D'Argenson's *Memoires*.

The other members of the Polignac family who have an historical name at all are more notorious than noteworthy. In the reign of Louis XVI., TOLANDE-MARTINE, GABRIELLE DE POLASTRON, DUCHESS DE P. (born 1749; died at Vienna, 9th December 1793), and her husband, JULES, DUC DE P. (died at St Petersburg, 1817), were among the worst, but unhappily most favoured advisers of Marie Antoinette. They obtained vast sums of the public money from their royal master and mistress, and were largely, if not mainly responsible for the frightful pecuniary extravagance of the court. The discovery of the famous *Libre Rouge* occasioned the exulting cry of Mirabeau: *Mille Écus à la Famille d'Assas pour avoir sauvé l'État; un Million à la Famille Polignac pour l'avoir perdu!* The Polignacs—knowing the deep hatred felt towards them by the French people—were the first of the noblesse to emigrate (16th July 1789). From the Empress Catharine of Russia, the duke received an estate in the Ukraine, and did not return to France at the Restoration. He left three sons and a daughter, of whom only one has become historical—AUGUSTE JULES ARMAND MARIE, PRINCE DE P. (born at Versailles, 14th May 1780). On the Restoration, he returned to France; became intimate with the Comte d'Artois, afterwards Charles X.; shewed an ardent attachment to the Church of Rome—or at least to its policy—and, in consequence, received from His Holiness, in 1820, the title of Prince; was appointed ambassador at the English court in 1823; and finally, in 1829, became head of the last Bourbon ministry, in which capacity he promulgated the fatal ordinances that called France to arms, and drove Charles X. from the throne. He then attempted to flee from the country, but was captured at Granville on the 15th of August; was tried, and condemned to imprisonment for life in the castle of Ham, but was set at liberty by the amnesty of 29th November 1836. He took up his residence in England, but died at Paris, 2d March 1847.

POLISH LANGUAGE AND LITERATURE.
The Polish language is one of the most widely-

spread branches of the Slavic, forming (according to Dobrowsky), along with the Bohemian, the western branch. It surpasses almost all the other Slavonic tongues in euphony and flexibility, and is scarcely excelled by any language in point of brevity. It does not make use of the article, but has a most elaborate declensional system, comprising seven cases. The conjugation of the verb is equally elaborate, and enables a Pole to express transitions and delicate niceties in the conditions of time and gender quite unknown to the French, or German, or English verb. The Polish vocabulary is also uncommonly rich. The number of harsh consonants in the language, it must be admitted, is large, and this fact is a marked distinction between it and its eastern sister, the Russian, but in pronunciation, these are so much softened that its euphony is preserved. It alone of all the Slavic dialects, with exception of the old Slavic Church language, has nasal sounds *ę*, like the French *on*; and *ą*, like the French *in*. The letter *ł* has also a peculiarly broad snarling sound. After the introduction of Christianity, Latin, the language of the church, exercised a powerful influence on its structure and development, and subsequent to the 14th c., it adopted into its vocabulary numerous German words. In the 16th c., Polish, as a written language, rapidly attained so high a degree of perfection that it supplanted even Latin itself, until then the language of the state and of the learned. The best Polish grammars are those of Mrongovius (3d ed., Danz. 1837), Bandtke (Breslau, 1824), and Muczkowski (Crac. 1845); the most comprehensive dictionary is that of Linde, after which rank those of Bandtke (2 vols., Breslau, 1806), Mrongovius (Königsb. 1835) and Trojancki (4 vols., Posen, 1835—1846).

The history of Polish literature is divisible into five clearly marked periods. The first extends from a date antecedent to the introduction of Christianity down to the close of the 15th century. Of pre-Christian Polish literature, nothing has survived but some popular songs and proverbs. Among the very oldest literary monuments is a hymn to the Virgin Mary, ascribed to St Adalbert. The introduction of Christianity paved the way for a Latin literature more or less ecclesiastico-historical. Casimir III. (q. v.), surnamed the Great, did more than any other early Polish monarch for the encouragement of literature, and, among other things, founded the university of Cracow, which, from the beginning of the 15th c., long continued to be the centre of intellectual life and culture in Poland. To the 15th c. belong Jan Długosz (Lat. *Longinus*), author of a most interesting and valuable *Historia Poloniae*, in 13 books, and otherwise worthy of remembrance as an able diplomatist and philanthropist; also Jan Łaski, Archbishop of Gnesen (b. 1457, d. 1531), whose collection of the oldest Polish laws, *Commune Inscriptio Poloniae Regni Privilegium*, is of great historical importance. In 1490, the first printing-press in Poland was established at Cracow.

The second period of Polish literature embraces the 16th and first quarter of the 17th c., and is marked by the use of the Polish as a written language. The reigns of Sigismund I. and Sigismund II. Augustus, are regarded as the golden era of Polish literature, properly so called. The series of poets begins with Nikol. Rej (b. 1515, d. 1568), commonly called the *Father of Polish Poetry*, a native of Zoravno, in 'Little Russia,' and educated at Lemberg and Cracow. He spent his life at the court of the Sigismunds. His principal works, *Wierunek Żywota Człowieka Pożycowego* (Crac. 1560) and *Apophthegmata* (Crac. 1568), are full of

various states of dilution. Usually, it is necessary to remove the acid with clean water, and dry rapidly, to prevent re-oxidation; and then either friction with various polishing materials, or rubbing with a smooth hard surface or burnisher, brings out the lustre of the metal.

POLISHING OF STONE. See **STONE.**

POLISHING SLATE, a mineral composed chiefly of silica, with a little alumina, lime, oxide of iron, and water; white, yellowish-white, or yellow; of a slaty texture, opaque, very brittle, and of specific gravity not much more than half that of water; so that it swims in water till its pores become filled with the liquid. It is found in Bohemia, Saxony, and Auvergne, and has been supposed to be a volcanic product, but it consists of silicious remains of *Diatomaceæ*. It is used for polishing glass, marble, and metals.

POLITICAL ECONOMY. The word economy is derived from the Greek for house-law or house-regulation. It refers to the material portion of domestic regulation, and does not, for instance, embrace the observance of religion or the communication of instruction. The most important part of it is the adjustment of the expenditure of the household to the income at their command. Hence the word economy is sometimes applied, both in a public and a private sense, to the saving of money. The term 'Political' came to be used along with it as a convenient method of expressing the application to a state of a sound system of management in relation to its affairs. In later times, however, the word, as applied to a community, came to be something totally different from its application to a household. It was thought that one could regulate a people just as a house is regulated, by adjusting the spending and the getting of the national wealth. Hence arose several doctrines now discarded—such, for instance, as 'the balance of trade,' which taught that the trade with any nation is only profitable when you sell more to that nation than you buy from it; the system of bounties upon special trades, as being more profitable to others; and lastly, the system of protection to native industry—the last relic of what may be called the positive school of economists. Political economy now means, not the art of regulating communities in this respect, but the science of those laws which Providence has established for their regulation. Hence the analogy with domestic economy ceases. Domestic economy is the positive regulation of a household—not the leaving of it to follow its own dictates; and, indeed, that there is a disposition, more or less in the head of every house, to limit its expenditure to its income, is one of the phenomena by which things right themselves, as it were, and make up those laws of nature which constitute political economy. A man knows that if he buys too much, he will become bankrupt; but we do not now order the wholesale merchant not to buy too much from this or that country, so as to place the balance of trade against us—we know that this naturally rights itself, because we must expect our own produce to pay for what we bring in. Even if we should have to pay for it in gold, that is a commodity produced by our people. The income and expenditure of the government, as apart from that of the people of the community, are of course under regulation like those of a household; but these form a separate field of operation, called Finance (q. v.). There are a few people who still hold that there is no natural system sufficient in itself to regulate the material affairs of mankind, and that these should be committed to the hands of special managers. Finding the approved doctrines of political economy going further and further from

their direction, such persons, though few in number, have been very absolute in their views, and zealous in pushing them. One class of these are called Socialists; and another, who go further lengths, are called Communists. It has not been considered necessary here to go beyond the mere description or definition of the nature of political economy, because the various parts of which it consists are given each under its own head, as BOUNTY, CAPITAL, COLONY, COMMUNISM, COMPETITION, CORN LAWS, DEMAND AND SUPPLY, EXCHANGE, FREE TRADE, LABOUR, MONOPOLY, NAVIGATION LAWS, RENT, VALUE, &c.

POLITICAL OFFENCES, crimes considered injurious to the safety of the state, or such crimes as involve a violation of the allegiance due by a subject to the supreme authority of the state.

By the Roman law, in the early times of the republic, every act injurious to the state was comprehended under the name *perduellio*, and visited with death. That term included conspiracy against the government, aiming at kingly power, aiding the enemies of Rome, and losing an army. The word *perduellio* afterwards fell into gradual disuse, and the chief state offences were known by the term *majestas* or *crimen læsæ majestatis*, somewhat akin to the treason of modern times. In the republican period, the crimes to which the epithet *læsæ majestatis* was most frequently applied, were the betrayal or surrender of an army to the enemy, the excitement of sedition, and such a course of administration as impaired the dignity of the state. In imperial times, acts and words disrespectful to the reigning emperor were included, and an indignity to his statue was visited nearly as severely as an offence against his person. *Læsæ majestatis* was generally punished with death, confiscation, and infamy. The criminal might even be tried after his death, to the effect of confiscating his property, and rendering his memory infamous—a practice which has been resorted to both in France and Scotland as late as the beginning of the 16th century.

In modern times, the acts brought under the category of political offences have varied much at different periods and in different countries. They have in general been more leniently dealt with under constitutional than under despotic governments. It is, however, a principle which has been generally recognised by the most constitutional of governments, that when the legislature thinks itself endangered by a secret conspiracy against the state, or an understanding with the enemies of the country, it permits the executive, for a limited time, to arrest suspected citizens, without the formalities which are required in ordinary circumstances.

In England, a large number of the graver political crimes are included under the denomination of Treason, and the treason law has sometimes been stretched so as to include offences which, by a fair construction, could hardly come within it, such as the use of violence to reform religion or the laws, or to remove the councillors of the sovereign. Even riotous assemblies with the object of destroying all property of a particular class have been held treason. Political offences also include a number of crimes against government falling short of treason, and passing under the name of Sedition, which, though they have for their ultimate object the violation of the public peace, do not aim at direct and open violence against the laws or the sovereign, but rather the dissemination of a turbulent spirit tending to produce such violence. The British government does not permit the political offenders of other countries to be included in extradition treaties; and in modern times, generally speaking, extradition does not apply to political offenders: contrary to the doctrine laid down by Grotius. In

introduced as a fashionable dance into Western Europe about 1841.

POLL-ACT, a sanguinary act, passed at Trim in Ireland, by the Junto of the Pale, in 1465, under the Earl of Desmond, deputy. It ordained 'that it shall be lawful to all manner of men that find any thieves robbing by day or night, or going or coming to rob or steal, or any persons going or coming, having no faithful man of good name and fame in their company in English apparell, that it shall be lawfull to take and kill those, and to cut off their heads, without any impeachment of our sovereign lord the king. And of any head so cut off in the county of Meath, that the cutter and his ayders there to him cause the saed head so cut off to be brought to the portreffe to put it upon a stake or spear, upon the Castle of Trim, and that the saed portreffe shall testify the bringing of the same to him. And that it shall be lawful for the saed bringer of the saed head to distrain and levy by his hand (as his reward) of every man having one ploughland in the barony, two pence; and of every man having half a ploughland, one penny; and of every man having an house and goods, value forty shillings, one penny; and of every cottier having one house and smoak, one half-penny.' Much slaughter is said to have been committed under this remarkable act.

POLL-TAX. See CAPITATION.

POLLACK (*Merlangus pollachius*), a fish of the family *Gadidae*, of the same genus with the Whiting and Coal-fish. It is common on the coasts of all parts of Britain; and in Scotland and some parts of Ireland, it is called *Lythe*. It is a very playful fish, often gamboling on the surface of the water. It attains about the same size as the coal-fish. It has three dorsal fins; the body is of a longish shape; the lower jaw is much longer than the upper; the tail is slightly forked. The flesh is reckoned superior to that of the coal-fish. Young pollacks are sometimes sold as whittings, to which, however, they are not nearly equal. No fish more readily rises to the artificial fly, and in this way great numbers are caught on the British coasts. The fly is merely a bit of white feather tied to a common bait-hook. Worsted is sometimes used instead of the feather; and flies of different colours are sometimes used together, with great success. No reel is employed, and any stick is good enough for a rod; a few yards of string make a sufficient line.

POLLAN (*Coregonus Pollan*; see *COREGONUS*), a fresh-water fish of the family *Salmonidae*, a native of lakes in Ireland. It is particularly abundant in Lough Neagh, where it is often seen in large shoals, which issue from the deep waters, and haunt the shore from spring to autumn, when great numbers are taken by nets, and sold in the neighbouring country. The P. is from 10 to 12 inches in length; it resembles the Gwyniad, but has not the snout produced like that fish; and there are differences in the size and position of the fins. It is very like *Coregonus sikus*, a species found in the most northern parts of Norway. The spawn of the P. is deposited in November and December on the rocky or stony parts of the bottom of the lake which it inhabits. It is a well-flavoured fish. The cry of 'Fresh Pollan' is even more common in Belfast during summer than that of 'Fresh Herring.'

POLLARDING (*to poll*, to cut off, or shave the head) is the cutting off of the whole crown of a tree, leaving it to send out new branches from the top of the stem. Trees thus treated are called *pollards*. The new branches are never equal in magnitude to the original branches of the tree, although often more numerous, and when pollarding

is often repeated, the scars and stumps form a thick ring at the top of the stem, from which many small branches spring. Pollards are not beautiful; but pollarding is practised with advantage in districts where fuel is scarce, the branches being cut off in order to be used for fuel, and the operation repeated

Pollard Oak.

every third or fourth year. It is much more prevalent in many parts of Europe than in any part of Britain, and in Britain is almost confined to those districts of England which are furthest from coal. Willows, Poplars, Alders, Elms, Oaks, and Limes are the trees most frequently pollarded, and in some parts of Europe the White Mulberry. The trees of most rapid growth are preferred where fuel is the object; and willows, poplars, and alders are planted along water-courses, and in rows in moist meadows and bogs. Oaks are sometimes pollarded chiefly for the sake of the bark of their branches, and the whole treatment very much resembles that of copse-wood. In some parts of Germany, landscapes may be seen of open country with many scattered oak and elm pollards, presenting a very peculiar appearance.

POLLEN. See STAMEN and FEUNDATION.

POLLENZA, a well-built town in the northern part of the island of Majorca, about 2 miles west of the Bay of Pollenza, and 28 north-west of Palma. It has a Jesuits' college and some manufactures of black woollen cloth. Pop. about 6500.

POLLIO, C. ABLUTUS, a politician, soldier, and author of considerable merit, and still more considerable reputation, was born in Rome 76 B.C., but belonged to a family of Marrucinian descent. His first ambition was to be an orator, and in his youth he seized every opportunity of hearing such men as Hortensius and Cicero. When civil war broke out between Caesar and Pompey, P. sided with the former, was present at the crossing of the Rubicon, and accompanied the great general in his rapid triumphal march through Italy. He joined Caesar in his expedition to Greece against Pompey, and took part in the decisive battle of Pharsalia, 48 B.C. At the time of Caesar's assassination (15th March, 44 B.C.), P. was governor of Hispania Ulterior (Further Spain), and carrying on the war against Sextus Pompey. In the subsequent struggles, he

part of Cochin-China. Having thus passed 17 years in the service of the Mongol khan, and visited the chief countries and cities of Eastern Asia, travelling through kingdoms (as China) which no European had ever seen before, and acquiring much knowledge of other kingdoms (as Japan, called by P. *Zipangu*), the existence of which was not even suspected, he succeeded in obtaining permission to join the escort of a Mongol princess, who was travelling to the court of Persia. The three Polos accordingly set out in 1291, travelling through China, and thence, by sailing through the Chinese Sea and Indian Ocean, finally arrived at Teheran, where they stayed for some time; but learning that Kúblai Khan was now dead, they continued their journey, and arrived at Venice in 1295, bringing with them much wealth and many precious objects, the fruits of their trading. Marco, in the following year, fought his own galley in the great battle off Curzola, in which the Venetians, under Dandolo, were defeated by the Genoese under Doria, and was taken prisoner and immured in a dungeon at Genoa. Here he dictated, with the aid of the memoranda he had made during his travels, an account of his journey through the East, which was subsequently revised with care. After his liberation he returned to Venice, where he was appointed member of the Grand Council, and died in 1323, eleven years after his father. His work is variously entitled, but the best edition is *Il Milione di Messer Marco Polo Veneziano*, edited by Count Baldelli (Florence, 4 vols. 4to, 1827), and accompanied with a map, notes, and illustrations. P.'s narrative created an immense sensation among the learned public, and many did not hesitate to affirm that it was a pure fiction; but the Catholic missionaries and subsequent Venetian travellers into these remote regions, verified many of P.'s statements, and then came a reaction of public opinion; P.'s wonderful minuteness, extensive research, and accuracy, being the theme of universal admiration. His work was of inestimable value as a stimulant and guide in geographical research; it encouraged the Portuguese to find the way to Hindustan round the Cape of Good Hope; and it roused the passion for discovery in the breast of Columbus, thus leading to the two greatest of modern geographical discoveries. The first edition of P.'s '*Voyages*' was published by Ramusio in his *Raccolta di Navigazioni e Viaggi* (Venice, 3 vols. fol. 1550—1559); and two English translations have been lately published, the one in Edinburgh (1844), and the other in London (1854). There is also a German one by Burck, with notes by Neumann (Leips. 1846).

POLO'TSK, a town of West Russia, in the government of Witebsk, and 60 miles west-north-west of the city of that name, on the banks of the Duna, where that river is joined by the Polota. It is one of the most ancient towns in Russia, having been founded in the 9th century. It is the seat of an archbishop of the Greek United Church, has a Kremlin, a district-school for the sons of nobles, several Greek and Roman Catholic churches. The town possesses a harbour, and has 15,028 inhabitants. Tanning is the only branch of trade carried on to any great extent. Under its walls, in the campaign of 1812, the Russian general, Wittgenstein, defeated the French under Oudinot and Sira.

POLTAVA, chief town of the government of the same name, is situated on the right bank of the Worskla, a tributary of the Dnieper, in lat. 49° 35' N., and long. 34° 34' E., about 934 miles south-south-east of St Petersburg. Pop. 20,200. P. has few manufactures, and its trade displays activity only during the annual fairs, of which there are

four. The most important is called the Ilnsky, which lasts from the 1st of July to the 1st of August. At these fairs, merchandise is exposed for sale worth £4,000,000. The principal articles of traffic are cloths, woollen tissues, colonial productions, fur, wool, horses, and agricultural produce and implements. P. was founded in 1608, and is historically famous as the scene of Charles XII.'s defeat by Peter the Great in 1709. A monument in the town square commemorates the victory of the czar; and at the distance of three miles from the town is the tomb of the fallen warriors, over which Peter erected a wooden cross, and which is still known as the 'Swedish Tomb.'

POLTAVA, a government of Little Russia, between the governments of Kiev on the west, and Kharkov on the east. Area, 19,071 square miles; pop. 1,879,912. The surface is flat, with a gradual slope south-west to the banks of the Dnieper, which forms the southern boundary, and into which the chief rivers—the Sula, Psiol, and Worskla—flow. The government does not abound in wood, but possesses rich and extensive pastures. The soil is for the most part clay and fertile vegetable mould, and the climate is healthy. Agriculture and cattle-breeding are the staple occupations. Oxen are made use of in all field operations. The various manufactories, chiefly brandy-distilleries, tan-yards, and sugar and cloth manufactories were (in 1859) only 575 in number, and gave employment to no more than 15,782 hands. Numbers of the inhabitants leave this for other governments, especially those of New Russia, in search of employment; and many of the peasantry are employed with their oxen in bringing salt from the lakes of the Crimea, and fish from the Don. Commerce, which is not carried on on a great scale, is chiefly in the hands of Jews. The fairs, of which 408 take place during the year, are the seasons of the greatest commercial activity. The most important fairs are those of Poltava and Romny.

POLYA'NDREY, or **POLYANDRIA**, that form of polygamy which permits a woman to have several husbands. See **MARRIAGE**. The hot-bed of polyandry is Tibet. There a wife commonly is the wife of a whole family of brothers—the elder brother being chief husband. In the Himalayan and sub-Himalayan regions adjoining and under the influence of Tibet, it is of frequent occurrence in the same form, as in the valley of Kashmir, in Ladak, among the Koech, among the Telingese. Further south in India, we find polyandry among the Tudas of the Nilgherry Hills, the Coorgs of Mysore, and the Nayars of Malabar. We find it again off the Indian coast in Ceylon; and going eastward, strike on it as an ancient though now almost superseded custom in New Zealand, and in one or two of the Pacific islands. Going northward, we meet it again in the Aleutian Islands; and taking the continent to the west and north of the Aleutians, it is found among the Koryaks, to the north of the Okhotsk Sea. Crossing the Russian empire to the west side, we meet it among the Saporogian Cossacks; and thus have traced it at points half round the globe. This is not all, however. It is found in several parts of Africa; and it occurs again in many parts of America among the red men. We have the authority of Humboldt for its prevalence among the tribes on the Orinoco, and in the same form as in Tibet. 'Among the Avaros and the Maypurea,' he says, 'brothers have often but one wife.' Humboldt also vouches for its former prevalence in Lancerota, one of the Canary Islands. Thus, polyandry is a phenomenon of human life independent

wood-spirit is the hydrated oxide of the radical methyl (C_2H_5), and is represented by the formula $C_2H_5O.HO$. According to the theory of chemical types (see TYPES, THEORY OF CHEMICAL), the alcohols are divided into *monatomic* and *polyatomic*. A molecule of water consists of two atoms of that substance, and is therefore represented by the formula H_2O , which may be arranged in the form

$H \begin{Bmatrix} \\ O_2 \end{Bmatrix}$. If half the hydrogen in this typical formula

be replaced by an organic radical, such, for example, as C_nH_{n+1} , C_nH_{n-1} , C_nH_{n-2} , C_nH_{n-3} , or C_nH_{n-4} (n being even in all these cases), we obtain what is termed a monatomic alcohol, one equivalent of hydrogen being here replaced. Besides the primary water-type represented by one molecule of water, there are derived or secondary and tertiary types, represented by two and by three molecules of water, and

expressed in the forms $H_2 \begin{Bmatrix} \\ O_4 \end{Bmatrix}$ and $H_3 \begin{Bmatrix} \\ O_6 \end{Bmatrix}$. If

half the hydrogen in $H_2 \begin{Bmatrix} \\ O_4 \end{Bmatrix}$ be replaced by an organic radical, we obtain an alcohol said to be *diatomic*, in consequence of its being formed by the replacement of two equivalents of hydrogen. Similarly, if half the hydrogen in $H_3 \begin{Bmatrix} \\ O_6 \end{Bmatrix}$ be replaced

by an organic radical, we obtain a triatomic alcohol. The term *polyatomic* is applied to all alcohols which are not monatomic.

POLYBASIC ACIDS. Most of the inorganic acids combine with bases in such a manner that one atom of the acid is united with one atom of a metallic oxide to form a neutral salt. Nitric acid may be taken as an illustration of the acids possessing this property, and which may therefore be called *monobasic*. In other cases, as, for example, that of pyrophosphoric acid (see PHOSPHORUS), one atom of acid possesses the property of combining with two atoms of base; such acids are termed *bibasic* or *dibasic*. There are strong grounds for believing that sulphuric acid is bibasic, in which case its formula would require to be doubled, and to be written $2HO.S_2O_6$. Common phosphoric and arsenic acids are examples of a third class of acids in which one atom combines with three atoms of base, and which are therefore termed *tribasic*. Whether any polybasic acids beyond tribasic acids exist, is uncertain, but it is probable that silicic acid is a *tetrabasic* acid.

Amongst the organic acids, a similar relation takes place, acetic, succinic, and citric acids affording examples of the monobasic, dibasic, and tribasic class.

The following are the most important general differences shewn by acids of different degrees of basicity.

1. Each *monobasic* acid can form but one ether, which is neutral. 2. A *Monobasic* acid cannot form a stable, well-defined acid salt, or a salt with two or more metallic bases.

1. Each *dibasic* acid can form two ethers, one neutral, and the other acid. 2. *Dibasic* acids can form with each metallic base a neutral salt and an acid salt. They can also form double salts containing two metallic bases.

1. Each *tribasic* acid can form three ethers, one neutral, and two acid. 2. *Tribasic* acids can form three salts with the same metallic base, two of them acid, and one neutral.

Many attempts have been made to account for the polybasic or monobasic character of an acid, from its composition. According to Kekulé (*Lehrbuch der organisch. Chemie*, vol. 1, p. 210—219), the basicity depends not, as was formerly supposed,

on the molecular constitution of the acid, but upon the amount of oxygen contained in its radical. For further details on this subject, the reader is referred to the article ACIDS in *Watt's Dictionary of Chemistry*, vol. 1, 1863.

POLYBIUS, the Greek historian, was born about 204 B.C. in Megalopolis, a town of Arcadia. From Lycortas, his father, who was among the leading men of the Achæan League, he received valuable instruction in the science of politics and in the art of war. In 181, he would have visited Egypt in the capacity of ambassador, but the project of sending an embassy to that country was given up. His engaging in public affairs probably dates from this period; and he rapidly gained the confidence of his countrymen. He was one of the 1000 noble and influential Achæans, who, after the conquest of Macedonia in 168, were sent to Rome on the summons of the commissioners from that city to answer the charge of having failed to assist the Romans against King Perseus. On their arrival in Italy in 167, they were not put upon their trial, but were distributed among the towns of Etruria. Owing, perhaps, to his having formed the friendship of Æmilius Paulus, or of his sons Fabius and Scipio, he was more fortunately allocated than others of his countrymen. His residence was fixed at Rome and in the house of Paulus. Scipio, then about 18 years of age, became strongly attached to P., made him his companion in all his military expeditions, and profited greatly by his knowledge and experience. P. in his turn derived much advantage from the protection and friendship of Scipio, who gave him access to public documents, and aided him in the collection of materials for his great historical work. In 151, the surviving Achæan exiles were permitted by the Roman senate to return to Greece, and among them was P., who arrived in Peloponnesus after a residence of 17 years in Italy. He soon, however, rejoined Scipio, followed him in his African campaign, and was present at the destruction of Carthage in 146. But the outbreak of war between the Achæans and Romans summoned him again to Greece, where he arrived soon after the taking of Corinth. All his influence was now exerted to procure from the conquerors favourable terms for the vanquished; and so grateful were his countrymen for his services in their behalf, that they erected statues in his honour at Megalopolis (his native town), Mantinea, Pallantium, Tegea, and other places. It must have been about this time that P. undertook the writing of his great historical work, the materials of which he had so long been collecting. We cannot now fix with accuracy at what period of his life he visited in foreign countries the places which he had to describe in his history. We know from himself that at one time, probably while accompanying Scipio, he undertook long and laborious journeys into Africa, Spain, Gaul, and even as far as the shores of the Atlantic, in order to add to the scanty knowledge previously existing with regard to these regions. In the latter period of his life, he travelled in Egypt; and about twelve years before his death, he probably accompanied Scipio to Spain, where he witnessed the fall of Numantia. He died about 122 B.C., in his 82d year, in consequence of a fall from his horse.

As a historian, P. occupies a high rank. His work, which began where that of Aratus broke off, includes the period between 220 and 146 B.C., the year when Corinth fell, and with it, the independence of Greece. Of the two parts into which it was divided, the first embraced a period of 53 years, commencing with the Second Punic War and the Social War in Greece, and concluding with the subjugation of the kingdom of Macedonia in 168. This, the chief

metal. His plan is extremely simple, though requiring great nicety in carrying it out. First, the picture is outlined upon a metal-plate; and supposing it intended to have two colours, then the details of only the chief colour are completed upon it, and all the parts for the other colour are cut out; and into those parts other plates are fitted, like the portions of a child's puzzle-map, but with very great exactness; and upon these the engraving for the parts of the second colour are completed. When these are done, a thickness of type-metal is attached to the back of these interior pieces, so that they can be held separately, and pushed forwards or drawn backwards at pleasure. Then they are so adjusted to the machinery of the press, that they are withdrawn when the first colour-roller passes over the surface of the main plate, and are pushed forward beyond the face of the main plate, so as to receive the colour of the second roller, which then passes over them without touching the first or main plate. Having received their coloured ink, the secondary plates are again moved back to a perfect level with the other, so as to form an entire plate, carrying two colours, which are thus, in the ordinary way, imprinted on the paper. Since Sir William Congreve's patent, very many improvements have been made, the principle, however, remaining the same, and it has now a very wide application.

POLYCOTYLEDONOUS PLANTS, those plants of which the embryo has more than two seedlobes or cotyledons. See **COTYLEDON** and **DICOTYLEDONOUS PLANTS**. In some of the *Coniferae* in particular, there are numerous cotyledons; the genus *Pinus* has from three to twelve. These cotyledons are placed in a whorl, and have the gemmule of the embryo in the midst of them. Polycotyledonous plants do not form a separate division of the vegetable kingdom, but are ranked with dicotyledonous plants; for plants with two, and plants with more cotyledons, are found not only in the same natural order, but in the same genus.

POLYCRATÉS, 'tyrant' of Samos, is a well-known name in ancient Greek history. He was born in the first part of the 6th c. B. C., but nothing is known of him until the time when, with the assistance of his brothers Pantagnotus and Sylosón, he obtained possession of the island. The three brothers at first ruled conjointly, but after a short time, P. put Pantagnotus to death, banished Sylosón, and made himself sole despot. His energetic, unscrupulous, and ambitious character now shewed itself more conspicuously than ever. He conquered several islands of the Archipelago, and even some towns on the Asiatic mainland, waged war successfully against the inhabitants of Miletus, and defeated their allies, the Lesbians, in a great sea-fight. His fleet amounted to 100 ships, and was probably at that time the most powerful in all Greece. P. seems to have aspired to the sovereignty of the *Ægean*, if not also of the cities of Ionia. His intimate alliance with Amasis, king of Egypt, proves the importance in which this daring island-prince was held even by great monarchs. According to Herodotus, Amasis drew off from his alliance through alarm at the uninterrupted good fortune of Polycratés. He dreaded, we are told, the misfortunes that the envious gods must be preparing for so lucky a mortal, and to which his friends would also be exposed. The particular incident that is said to have finally ruptured the alliance is doubtless mythical, but is so well known that we cannot afford to overlook it. Amasis is reported to have written a letter to P., earnestly advising him to throw away the possession that he deemed most valuable, and thereby avert the stroke of the

spleenful gods. P., in compliance with this friendly advice, cast a signet-ring of marvellously beautiful workmanship into the sea, but next day a fisherman presented the 'tyrant' with an unusually big fish that he had caught, and in its belly was found the identical ring. It was quite clear to Amasis now that P. was a doomed man, and he immediately broke off the alliance. So, at least, Herodotus tells the story, but Grote (*History of Greece*, vol. iv. page 323) suggests—and the suggestion is far more probable—that P., with characteristic perfidy, abandoned the Egyptian for a Persian alliance, when he found the latter likely to be of more value to him in his ambitious designs. When Cambyses invaded Egypt (525 B. C.), P. sent him a contingent of forty ships, in which he placed all the Samians disaffected towards his 'tyranny,' and told the Persian king privately not to let them come back! However, they escaped in some way or other the fate which P. had designed for them, returned to Samos, and made war against the 'tyrant,' but without success. Hereupon, they went to Sparta, and succeeded in enlisting the sympathies, or, at any rate, in securing the help of both the Spartans and Corinthians. A triple force of Samians, Spartans, and Corinthians embarked for Samos, and attacked the city. After vainly besieging it for forty days, they sailed away, and P. now became more powerful than ever; but Nemesis had her victim after all. A certain Oretes, the Persian satrap of Sardis, had, for unknown reasons, conceived a deadly hatred against P., and having enticed the latter to visit him, by appealing to his cupidity, he seized and crucified him. Thus perished ignominiously, in the midst of his power and splendour, one of the most famous *thalassocrats*, or sea-kings, of Greek antiquity. He was a patron of literature and the fine arts, and had many poets and artists about his court. His intimacy with Anacreon, in particular, is quite a celebrated thing, and in his praise that joyous bard wrote many songs. To P. also, in all probability, belongs the construction, or at least the enlargement, of those great buildings which Herodotus saw at Samos.

POLYDIPSIA (Gr. *great thirst*) is the term now commonly applied to the disease formerly known as *Diabetes insipidus*. It is characterised, as its name implies, by extreme thirst, and by an enormous discharge of pale watery urine. The affection is one of rare occurrence, and the persons most liable to it are dyspeptics who have passed the period of middle life, and whose bodily powers are failing, although (as the case we shall immediately notice, and one recorded by Dr Watson, shew) it may begin in childhood. The two prominent features of this disease usually lead to the suspicion that true diabetes is present; but the low specific gravity of the urine, and the absence of sugar in it in polydipsia, and the reverse condition in diabetes, seem to make the distinction easy. Dr Willis, in his work *On Urinary Diseases*, records the case of a man, aged forty-five, who was admitted for an accident into the *Hôtel-Dieu* at Paris, and who passed, daily, on an average, thirty-four pounds of urine, and drank thirty-three pounds of water, the normal daily excretion of urine being a little less than two pounds. This person reported that he had been affected in a similar manner ever since his fifth year, and that, from the age of sixteen upwards, he had daily consumed not less than two bucketfuls of water, and discharged a commensurate quantity of urine. Little good can be effected by treatment, further than stimulating the action of the skin by the use

le Jay. It is in ten splendid volumes, and contains, in addition to the contents of the Antwerp Polyglot, another Syriac version, and an Arabic version, together with the Samaritan version and the Samaritan text of the Pentateuch, each of these being accompanied by a literal Latin translation.—The London Polyglot was edited by Brian Walton, afterwards Bishop of Chester, and it engaged for many years a number of the most eminent linguists of the period. The number of its languages is not the same in all parts of the Bible; but it may be said to contain the Bible, or portions of it, in nine languages—Hebrew, Samaritan, Chaldee, Syriac, Arabic, Ethiopic, Persian, Greek (each of these accompanied by a literal Latin version), and Latin. It is in six vols. folio, and was published in 1654–1657; and was followed, in 1669, by the *Lexicon Heptaglotton* of Edmund Castell, two vols. folio, containing dictionaries of all the languages of the polyglot, except the Greek and Latin. Of the minor polyglots, the chief are (1) the Heidelberg Polyglot (1586), Hebrew, Greek, and Latin; (2) Wolder's Polyglot (Hamburg, 1596), Hebrew, Greek, Latin, and German; (3) Hutter's Polyglot (Nürnberg, 1599), Hebrew, Chaldee, Greek, Latin, German, and French; (4) Reineccius's Polyglot, in Syriac, Greek, Latin, and German (Leipzig, New Testament, 1712; Old Testament, 1750, 1751); (5) Bagster's Polyglot, a very valuable collection of modern versions, folio (London, 1831). It contains eight versions in the Old Testament, viz., Hebrew, Greek, English, Latin, French, Italian, Spanish, and German; and nine in the New, Syriac being added to those already named. (6) A useful 'Haud Polyglot,' containing in the Old Testament, Hebrew, Greek, Latin, Vulgate, and Luther's German version; and in the New, Greek, Latin, Luther's German, and in the fourth column, in which are presented the chief differences between this and other German versions.

Besides the Bible, many other works, or small pieces, have been published in polyglot. Of smaller pieces, the Lord's Prayer has been the favourite, of which many collections, containing a greater or less number of languages, have been published from the 16th c. downwards. Of these, the most comprehensive, and, for philological purposes, by far the most valuable, is the well-known *Mithridates* of Adelung, which contains the Lord's Prayer in upwards of 400 languages, with vocabularies and grammatical explanations of most of the specimens.

POLYGNOTUS, a distinguished Greek painter of antiquity, was born towards the beginning of the 5th c. b. c. He was a native of the isle of Thasos, and belonged to a family of painters, who came to Athens to practise their profession probably after the subjugation of Thasos by Cimon. P. and his brother, Aristophon, were instructed in the principles of art by their father, Aglaophon. We know almost nothing of their lives, except that P. was a friend of the Athenian general above mentioned, and is said to have been attached to his sister, Elpinice. He died about 426 b. c. P. was a contemporary of the great sculptor, Pheidias (q. v.), and flourished during the supremacy both of Cimon and Pericles; but we hear little or nothing of him under the latter ruler; and although the first painter of his day, it does not appear that he was engaged in the decoration of any of those splendid buildings with which that statesman adorned Athens. It is not at all unlikely that Pericles was averse to patronising a friend of Cimon, and, at all events, P. was absent from Athens for 14 years (449–435 b. c.) of Pericles's rule, painting at Delphi and elsewhere. His principal works (following a chronological arrangement as far as it can be

ascertained) were: 1. Paintings in the Temple of Theseus at Athens. 2. In the Stoa Poecile (or Painted Portico) at Athens, representing the Greek princes after the taking of Troy, assembled to judge of the violation of Cassandra by Ajax. 3. In the Anakeion, or Temple of the Dioscuri, a painting of the marriage of the daughters of Leukippos. 4. In the Temple of Athena Areia at Plataea, a picture of Ulysses after having slain the suitors of Penelope. 5. In the Leschê (or 'Conversazione Saloon'), a famous quadrangular court, or peristyle, surrounded by colonnades, built at Delphi by the Cnidians. The walls of this edifice were covered by P. with a series of paintings representing the wars of Troy, and the return of the Greek chiefs, and considered P.'s masterpiece. 6. In the chamber adjoining the Propylæa of the Acropolis. From the criticism of the ancients, it seems quite clear that P. was a great advance on any of his predecessors. He was the first who gave life, character, expression to painting. According to Pliny, he opened the mouth and shewed the teeth of his figures; he was the first to paint women with transparent drapery, and with rich head-dresses. Lucian also speaks of his exquisite skill in painting eyebrows and the blush on the cheek; while Aristotle extols the ethical or ideal beauty of his conceptions, saying that P. 'represented men as better than they were,' and finding a parallel for his style in the epic poetry of Homer.

POLYGON (Gr. *polys*, many; *gōnia*, a corner), a plane figure, bounded by a number of straight lines; the name is conventionally limited to those plane figures whose bounding straight lines are more than four in number. Polygons of 5, 6, 7, 8, &c. sides are denominated pentagons, hexagons, heptagons, octagons, &c.; and when the number of sides exceeds twelve, the figure is merely mentioned as a polygon of so many sides. The quindecagon, or figure of 15 sides, is the only common exception to this rule. Polygons have many general properties; such as, that the sum of the angles of a polygon, when increased by four right angles, or 360°, is equal to twice as many right angles as there are sides in the polygon, and that (supposing the number of sides of the polygon to be expressed by n) the number of its diagonals is $\frac{n(n-3)}{2}$; also

if a polygon of an even number of sides be circumscribed about a circle, the sums of its even and odd sides are equal; and if a polygon of an even number of sides be inscribed in a circle, the sums of its even and odd angles are equal. A polygon which has all its sides and angles equal is called a *regular* polygon. All polygons of this class are capable of being inscribed in, or circumscribed about, a circle; but though the problem is merely to divide the circumference of a circle into a number of equal parts corresponding to the number of sides in the polygon, geometry was till lately only able to perform it in those cases where the number of sides of the polygon belongs to one or other of the series 2, 4, 8, 16, &c.; 3, 6, 12, 24, &c.; or 5, 10, 20, 40, &c. Gauss (q. v.), however, in the beginning of the present century, shewed how it could be done in the case of all polygons the number of whose sides was of the form $2^n + 1$ (provided it be a prime number), or a multiple of this prime number by any power of 2. This discovery supplies us with innumerable series representative of the numbers of the sides of polygons which can be described around or inscribed in a circle, such as 17, 34, 68, &c.; 257, 514, 1028, &c.

POLYONEÆ, or **POLYONEÆ**, a natural order of exogenous plants, mostly herbaceous plants, but including a few shrubs, and even trees. The

islands, in contradistinction to the coralline or low islands. They consist of basalt and other igneous formations. Of these, the principal are the Friendly Islands, one of which, Otaheite or Tahiti, has a mountain rising to the height of 10,000 feet; the Marquesas Islands, also very high; the Samoan or Navigator's Islands; and the Sandwich Islands, of which Owyhee or Hawaii possesses several both active and extinct craters, 13,000, 14,000, and even 16,000 feet high. The Galapagos group, nearest of all to South America, are likewise of igneous origin, and have several still active craters. The remaining islands are for the most part of coralline formation.

The coral islands (q. v.) may be distinguished into three classes—namely, atolls or lagoon islands, barrier reefs, and fringing reefs. The atolls are rings of coral reefs, surrounding a basin of sea-water of considerable depth, which is enclosed within this area. Examples of these are found in the Caroline Islands, the Dangerous Archipelago, and several other groups. Barrier reefs differ from the atolls chiefly in the fact of their containing an island in their centre, the island being separated from the reef by a body of deep water; while the reef is in some instances entirely converted into land, and in others the sea washes over it, except in certain portions, which project above the level of the ocean. Barrier reefs occur among the Society Islands, the Gambier Islands, and many other groups. Fringing reefs are collections of coralline formation, which are found skirting the coasts of an island in the same manner as the barrier reefs, but without any interior deep water channel. They are found in almost all the groups. From the fact of some of these islands being undoubtedly volcanic, it has been argued that all were originally of the same character; those of coralline formation being based upon the crests of submarine volcanoes, over which the coral insects have for an indefinite series of years been engaged in rearing their limestone structures. In opposition to the volcanic theory, Dr Darwin has propounded one of his own—namely, the *theory of subsidence*, which, after mature consideration, he believes to be the only one capable of explaining the various phenomena observable in the coral atolls, barrier reefs, and fringing reefs of the Pacific. All these he considers as being the production of saxigenous insects, working upwards from the foundations of what were originally so many islands, erect above the surface of the ocean, but which during long ages have been in a state of gradual subsidence. With respect to the atolls, he states it as his belief, that the lagoon is precisely in the place which the top of a shoal, and, in other cases, the highest part of an island, once occupied. So soon as these have sunk to a depth of from 120 to 180 feet below the surface, the coral insects (which it is agreed are never found at a lower depth) commence their operations, and these working on in countless myriads, the sunken island, or a portion of it, is in process of time again reared to the level of the surrounding sea. It would take too long to specify all the phenomena upon which Dr Darwin has based this ingenious theory, especially those connected with what are called the fringing reefs. It must be mentioned, however, that paradoxical as such a theory may seem, it has received the hearty support of no less distinguished a geologist than Sir Charles Lyell, who, in the early editions of his *Principles of Geology*, having held to the volcanic theory, has since abandoned it for that pronounced by Dr Darwin. Nor is this all; for, in the last edition of Sir C. Lyell's work, we find him mentioning with approval Dr Darwin's 'important generalisation that the Pacific and Indian Seas, and some of the lands which border them, might

be divided into areas of elevation and areas of subsidence, which occur alternately.'

Of the islands generally, we need only further observe that, although situated within the tropics, the heat of the atmosphere is delightfully tempered by a succession of land and sea breezes. The soil is exceedingly fertile, and besides the vegetable productions found growing when the islands were first discovered by Europeans, it has given a welcome home to the orange, lemon, sugar-cane, guava, cotton, potato, melon, and other fruits and plants introduced by foreign visitants. The only native quadrupeds on any of the islands when first visited were pigs, dogs, and rats; but the ox, the sheep, the goat, and even the horse, have since been successfully introduced into many of the groups. The feathered tribes are numerous, likewise the insects, and the coasts everywhere abound with a vast variety of fish and crustacea, highly important as a matter of food to the inhabitants of those islands in which quadrupeds, whether native or introduced, are found in only a small number.

For a more particular description of the several groups, we refer to the distinct articles of *FUTU*, *FRIENDLY ISLANDS*, *SANDWICH ISLANDS*, &c.; and shall now proceed to speak of the inhabitants generally under the head

POLYNESIANS.—This race of people, supposed at one time by certain writers to be of American origin, is now almost universally admitted to have a close affinity with the Malays of the peninsula and Indian Archipelago, and hence is classified with them by Dr Latham under his subdivision of *Oceanic Mongolids*. In physical structure and appearance, the Polynesians in general more nearly resemble the Malays than they do any other race, although differing from them in some respects, as, indeed, the natives of several of the groups also do from each other. In stature, they are generally taller than the Malays, and have a greater tendency to corpulence. In colour, also, they more nearly approach that of the Europeans. The hair is often waved or curling, instead of long and straight, and the nose is frequently aquiline. These differences, however, which may all have been produced by lapse of time and different conditions of existence, offer no barrier to the strong presumption, that at some long antecedent period these islands were colonised by Malay adventurers. The Malays are known at the present time to be expert and daring sailors, and in the 16th c. were so powerful at sea, that they had frequent naval combats with European fleets in the Indian Archipelago. In 1573, the king of Acheen, with a powerful armament, attacked and destroyed three Portuguese frigates; and in 1582, the same king attacked Malacca with a fleet of 150 sail. At a later period—namely, in 1615, one of his successors attacked the same settlement with a fleet of 500 vessels of various sizes and 60,000 men. If this was their strength and enterprise at a comparatively modern period, may they not have been as enterprising, if not quite so powerful, in far more remote times? The distance between the more western groups of P. and the eastern islands of the Indian Archipelago is not so great but that it could have been easily overcome by a hardy race of sailors, even although their vessels may have not been so well constructed as in modern times; and the same reasoning holds good with respect to the other groups extending still further east, or still more to the north or south. Each island or group, as it was attained, would only form a convenient point of departure in process of time for some other island or group more remotely situated. It is true that the affinities of language are not great between the Malays and the Polynesians; still, some affinity

A Fugue (q. v.) is the most perfect example of polyphonic composition. The difference between homophonic and polyphonic compositions is not always so marked as to leave it free of doubt whether a part is subordinate or independent; and many compositions consist of an alternation of homophonic and polyphonic passages. The construction of polyphonic phrases is called Counterpoint.

POLYPL, or POLYPES, a class of animals which were, till the last few years, included in the RADIATA of Cuvier, but which, since the Radiata have ceased to be regarded as a sub-kingdom, have found a place in the sub-kingdom COELENTERATA. See SUB-KINGDOMS, ANIMAL. The name *Polypli*, or *Polypes*, was given by Reaumur about the middle of the last century to these animals, on account of their external resemblance to the many-armed cuttle-fishes, which were so denominated by Aristotle; and our knowledge of these organisms, as members of the animal kingdom, hardly dates back much more than a century. All polypes are aquatic in their mode of life, and almost all of them are inhabitants of the sea, two genera only (*Hydra* and *Cordylophora*) of fresh-water polypes being as yet known. Most of them live in societies of considerable extent, supported on a common stock, to which the term *polypidom* (polyp-home) is usually given, and which is sometimes horny, and sometimes calcareous. The polypes are either embedded in cavities in the substance of the calcareous polypidom, or enclosed in minute cups or tubes, from which the body can be protruded, and into which it can be retracted at pleasure, in the horny polypidoma. The solitary species often attain a considerable size (as, for instance, many of the Actinias); but the social polypes are always minute, although the combined power of some of the species in modifying the earth's crust is neither slight nor limited in extent. 'They have built up a barrier reef along the shores of New Caledonia for a length of 400 miles; and another, which runs along the north-east coast of Australia, 1000 miles in extent. To take a small example: a single atoll (or coral island) may be 50 miles in length by 20 in breadth; so that if the ledge of coral rock forming the ring were extended in one line, it would be 120 miles in length. Assuming it to be a quarter of a mile in breadth, and 150 feet deep, here is a mound, compared with which the walls of Babylon, the great wall of China, and the pyramids of Egypt are but children's toys; and built, too, amidst the waves of the ocean, and in defiance of the storms.'—Owen, *Lectures on the Invertebrate Animals*, 2d edit., p. 143.

The bodies of these animals are generally soft, and cylindrical or oval in shape; and the mouth, which is the only aperture of the digestive canal, and is quite destitute of any masticating apparatus, lies in the centre of the anterior or free extremity of the body, and is surrounded by a fringe or circle of tentacles or arms. The skin in the social polypes is exceedingly soft and delicate; but in the solitary species, it is often of a leathery consistence. It almost always contains peculiar urticating organs, or thread-like cells, which may be regarded as one of the distinctive characters of the Coelenterata. Various arrangements of the polypes have been proposed, but it is sufficient for all practical purposes if we admit two orders—namely, the *Hydrozoa* and the *Anthozoa* (or *Actinozoa*), which differ essentially in the following points: in the *Hydrozoa*, the wall of the digestive sac is not separated from that of the somatic (or bodily) cavity, and the reproductive organs are external; while in the *Anthozoa*, the wall of the digestive sac is separated from that of the somatic cavity by an intervening space,

subdivided into chambers by a series of vertical partitions, on the faces of which the reproductive organs are developed. The *HYDRA* (q. v.), or Fresh-water Polype, is the type of the *Hydrozoa*. A few of these polypes are simple animals, as, for example, *Hydra*, *Corymorpha*, *Vorticella*, and *Myriothela*, but the greater number are compound or composite, exhibiting a numerous colony, connected with one another by a common trunk or *coenosarc* (from the Gr. *koinos*, common, and *sarx*, flesh), which usually presents an erect tree-like form. A sufficient idea of the form and structure of the simple polypes of the class will be obtained by a reference to the article *HYDRA*, and by a glance at the accompanying figure of *Corymorpha nutans*, which attains a length

Fig. 1.—*Corymorpha nutans*.

of between four and five inches, and was discovered by Forbes and Goodsir when dredging in the north of Scotland. They observe, that when it was placed in a vessel of sea-water, it presented the appearance of a beautiful pink flower, its head gracefully nodding (whence the specific name given to it by Sars, who had previously discovered it on the Norwegian coast), and bending the upper part of the stem; it waved its long white tentacles to and fro at pleasure, but seemed to have no power of contracting them. The compound *Hydrozoa* include, *inter alia*, the orders *Sertularia* (embracing the various species of *Sertularia*, *Campanularia*, *Loomedea*, &c.) and *Tubularia* (embracing the various species of *Tubularia*, *Eudendrium*, *Bimeria*, &c.). A good idea of the nature of the compound *Hydrozoa* may be formed from the consideration of the *Campanularia dichotoma*, a common organism on our shores. The compound polype-animal, or association of polypes, resembles a miniature tree. It consists essentially of a ramified tube of irritable matter, defended by an external flexible, and frequently jointed horny skeleton, *α*; and is fed by the activity of the tentacula, *δ*, and by the digestive powers of

munity. The soft integument of the nutrient polypes (d, e, g) contains the thread-cells, to which

that of the Actinia an internal calcareous axis or skeleton, which, penetrating into the interior of the organism, presents the lamellated and radiated structure recognisable in the *Fungia*, and in the skeletons of *Caryophylla*, *Madrepora*, &c. Such Anthozoa are termed coralligenous; and every hard structure deposited in or by the tissues of this class, and forming a uniform framework, is recognised by zoologists as a coral. Like the members of the preceding class, many of the Anthozoa multiply freely by gemmation, complex or compound animals or colonies of animals being formed, in which individual polypes are united by a coenosarc or polypidom. For a description of the mode in which communication takes place between the common body or mass and the individual polypes, we must refer to the article ALCYONIUM. Various arrangements of this class have been proposed by zoologists. If we exclude the consideration of fossil genera, we may divide the Anthozoa into two orders—the *Alcyonaria* and the *Zoantharia*.

The *Alcyonaria* may be characterised as Anthozoa in which each polype is furnished with eight tentacles, not simple, as in Actinia, but furnished with pinnate margins, with eight somatic chambers, and eight mesenteries. With the exception of one genus, they are all composite in structure; their polypes being connected with one another by a coenosarc, which is traversed by prolongations of the somatic cavity of each polype, a system of canals being thus formed whose parts freely communicate and are readily distensible. Carus, in the *Handbuch der Zoologie*, 1863, vol. 2 (of which he is joint author with Peters and Gerstaecker), mainly adopting Milne-Edwards's arrangement, divides the *Alcyonaria* into the three following families: 1. *Alcyonidae*; 2. *Gorgonidae*; 3. *Pennatulidae*. In the

Fig. 2—*Campanularia dichotoma*, magnified.

allusion has previously been made. These are protruded when the skin is irritated, and give the tentacles the appearance of being beset by minute bristles. The digestive sac of each polype is lined by a ciliated epithelium; but there is a perforation at the base communicating with the central tube, f. This outlet admits only of the passage of the fluid contents of the stomach, undigested matters being ejected by the mouth. There is reason to believe that sea-water enters the branches of the tube f, and circulates, by means of the ciliated epithelium, through the compound organism; and by this means contributes to the respiratory process. 'At certain points of these ramified polypes,' says Professor Owen, 'which points are constant in and characteristic of each species, there are developed little elegant vase-shaped or pod shaped sacs, which are called the ovigerous vesicles, or *ovicapsules*. These are sometimes appended to the branches, sometimes to the axilla, as at h, i, k (in fig. 2). They are at first soft, and have a still softer lining membrane, which is thicker and more condensed at the bottom of the vesicle. It is at this part that the ova or germs are developed, and for some time these are kept in connection with the vital tissue of the polype by a kind of umbilical cord. In all the compound *Hydrozoa*, the *ovicapsules* are deciduous; and having performed their functions in relation to the development of the new progeny, drop off like the seed capsules of plants.' On other individuals of the same species, sperm-capsules are developed, which, in form, resemble the *ovicapsules*, but in place of ova, contain spermatozoa. The act of fertilisation in most cases occurs by diffusion of the spermatozoa in the surrounding water. There is much that still requires elucidation in reference to the various modes of reproduction of this class. Many of the *Hydrozoa* have been shewn to be merely larval forms of Medusa. See GENERATIONS ALTERNATION OF.

The leading anatomical distinction between the *Anthozoa*, or *Actinozoa*, and the *Hydrozoa* has been already noticed. The common *Actinia* (q. v.) may be regarded as the type of this class, all of which

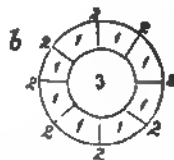


Fig. 3.—Diagram illustrating the Morphology of Anthozoa.

a, polype of *Alcyonaria*; b, ideal section of the same; 1, 1, 1, &c., the somatic cavity, divided by the mesenteries, 2, 2, 2, &c., into eight chambers; 3, the digestive cavity.

Alcyonidae, he includes the beautiful organ-pipe corals, of which Green and others make a separate family. The polypidom constructed by *Tulipora musca* consists of successive stages of cylindrical tubes of a rich crimson colour, united at various heights by means of horizontal connecting plates. The tubes placed upon the upper stage are alone

inhabited by living polypes, of a violet or green colour, the occupants of those below having successively perished as fresh generations appeared

Fig. 4.—*Tubipora musica*.

above them. As an example of the *Gorgonidae*, we may take *Isis hippuris*, in which the skeleton is made up of alternate joints of calcareous and horny

Fig. 5.—*Isis hippuris*.

matter, with the view of giving the necessary flexibility. In the *Pennatulidae*, the polypidom is free, and no polypes are attached to its basal portion. The *Sea-pens* (*Pennatula*) of our own coast afford a good example of this family. See *PENNATULA* for description and figure.

The *Zoantharia* may be characterised as *Anthosoa* in which the tentacles are either simple or branched, in general numerous, and together with the mesenteries, disposed in multiples of five or six. They may be arranged in the three following sub-orders—1. *Z. Malacodermata*; 2. *Z. Sclerodermata* or *Madrepores*. The first sub-order has been variously subdivided into families and sub-

families, which it is unnecessary to notice. It contains all the sea-anemones and animals allied to them, including the genera *Actinia*, *Anthea*, *Coryactis*, *Capnea*, *Adamastor*, *Ilyanthus*, *Sagartia*, *Bonelia*, *Edwardia*, *Peachia*, &c.; and the *Zoanthida*, which are aggregated polypes arising from a common creeping root-like fleshy band, and of which at least one species, *Zoanthus Couchii*, is an inhabitant of the British seas. All the members of the second sub-order are composite structures. *Antipathes*, the type of the group, presents a stem-like, simple, or branching caenosarc, which in one species tapers to a length of more than nine feet, with a diameter, at the base, not exceeding three-tenths of an inch. The third sub-order (the *Madrepores*) is a very extensive one. It is divided into the *Madrepore aporosa* and *M. perforata*, according as the coral exhibits a solid or a porous structure. *M. aporosa* may be arranged in the following families—1. *Turbinolidae* (including the sub-families *Caryophyllinae* and *Turbinolinae*); 2. *Oculinidae*; 3. *Astræidae*; 4. *Echinoporinae*; 5. *Merulinæ*; 6. *Fungidae*: while the *M. perforata* are divided into (1) *Madreporidae* and (2) *Poritidae*. A few of the commoner forms of *Madrepore* are delineated in the articles *CORAL* and *MADREPORE*. Amongst the most important works on this department of zoology may be mentioned Dana's *Structure and Classification of Zoophytes* (Philadelphia, 1846), and his *Report on Zoophytes*, and *Atlas of Zoophytes* (U.S. Exploring Expedition), 1849; Johnston's *British Zoophytes*, in 2 vols., to which we are indebted for many of our illustrations; Milne-Edwards and Haime, *Histoire Naturelle des Coralliaires ou Polypes proprement dits* (3 vols., 1857—1860); and Lacaze-Duthiers, *Histoire Naturelle du Corail, Organisation, Reproduction, &c.* (1864).

POLYPODIUM, a genus of Ferns, with sporocases on the back of the frond, distinct, ring-shaped, in roundish sori, destitute of *indusium*. Several species, differing very considerably in appearance, are natives of Britain, where no fern is more common than *P. vulgare*. It grows on rocks, trees, dry banks, &c., and has fronds 2—18 inches long, deeply pinnatifid, with large sori.—*P. Dryopteris*,

Polypodium:

1. *P. Dryopteris*; 2. *P. vulgare*.

with delicate ternate bipinnate fronds, is a fine ornament of many dry stony places in Scotland.—*P. Calaguala*, a native of Peru is said to possess

composition, the German language, drawing and designing (of plans, figures, and maps). The staff of instructors consists of 20 professors and masters, and 18 tutors.

Though its main object is the recruiting of the public service, yet from the P. have proceeded almost all the celebrated French mathematicians and philosophers of the last half-century.

POLYTHEISM. See GOD.

POLYZO'A, known also as BRYOZOA (from the Greek *bryon*, moss, and *zoon*, an animal; because many of these organisms incrust other animals or bodies like moss), and CILIOBRACHIATA (from the circumstance that their tentacles are ciliated), are so called from many individuals being united into a colony or polyzooary. Although Dr Grant, in his *Observations on the Structure and Nature of Flustra*, in 1827, and Milne-Edwards and Audouin, in their *Résumé des Recherches sur les Animaux sans Vertèbres faites aux îles Chaussey*, in 1828, indubitably shewed that these animals more closely resembled, in the details of their organisation, the molluscs than the radiate sub-kingdom, with which they were formerly confounded, some of our most esteemed English writers (including Professor Owen) persist in retaining them among the Polypæ, instead of placing them in their true position amongst the molluscoid animals.

Most of the P. are microscopic, but as they occur in colonies, they often collectively form sufficiently conspicuous masses, and although there is little diversity in the form or structure of the animals themselves, there is much difference in the form, arrangement, and composition of the cells or chambers in which the individual animals reside. 'In general,' says Mr Gosse, 'the form of the cell is ovate or oblong; but the general shape is variously modified, being tubular, club-shaped, horn-shaped, cradle-shaped, square, &c.' The arrangement is often shrub-like, or the cells may be arranged in close series, either adhering in irregular patches, as the *Leprælia*, or rising into broad, flexible leaves, as the

cell, with whose walls it is connected only by means of muscular bands and threads at certain points, and by the covering of the mouth of the cell. The animal may either expand itself to a considerable extent out of the mouth of the cell, or it may be altogether restricted within the latter; their movements being due partly to pressure upon the outer walls, and partly to the muscular bands, which act chiefly as retractors. On examining one of these organisms in the expanded state, the mouth is seen to be surrounded by a crown of tentacles, which are most commonly ten or twelve in number, and are clothed with vibratile cilia, which lash the water towards the mouth, and thus create numberless little whirlpools, by which nutritious matter is conducted into the oral aperture of the polyzoa. These ciliated tentacles, which are seen in C, a, in the figure, constitute one of the essential points of difference between these animals and the hydriform polypæ, with which they were formerly associated. The mouth leads to a funnel-shaped cavity or pharynx b, which is succeeded by an œsophagus c, and a true digestive stomach d (between which a muscular gizzard intervenes in certain genera), after which the intestine, e, turns back upon itself, and terminates in an anus, f, near the mouth. In the separate intestine and anal orifice, we have another characteristic distinguishing these animals from the polypæ. At the base of the tentacular circle, just above the anal orifice, is a nervous ganglion, which in all the P. lies on the re-entering angle, between the two extremities of the intestinal canal. No heart has as yet been discovered, the matters, which result from digestion, percolating through the intestinal walls, and becoming mixed with the fluid in which the viscera float. According to Professor Allman, three distinct modes of reproduction occur in the P., viz., by buds or gemmæ, by true ova, and by free locomotive embryos. This subject, however, requires further investigation.

Minute appendages, of a very remarkable character, are fixed to the cells of many of the genera. They are termed *Avicularia*, or 'Birds'-head Processes,' and *Vibracula*, or whip-like spines. The *Avicularia* were described by Ellis, who first noticed them (in his *Essay towards a Natural History of the Corallines*, 1758), as resembling 'a bird's head with a crooked beak, opening very wide;' they consist of a fixed and a movable nipper, like a crab's claw, the latter being worked by special muscles. These moving beaks have been often observed to seize minute animals; but as these organs have no power of passing their prey to the mouth, the P. cannot receive nourishment from this source. Mr Gosse ingeniously suggests that 'the seizure of a passing animal, and the holding of it in the tenacious grasp until it dies, may be a means of attracting the proper prey to the vicinity of the mouth.' The

vibracula consist of a long, slender movable seta or bristle, which, according to Gosse, serves 'to rid the animal of intruding vagrants, and to cleanse

A

B

C

Eschæra Cervicornis:

A, portion of its coralline fabric, of the natural size; B, portion of a young branch, enlarged, to shew the arrangement of the superficial apertures; C, an individual withdrawn from its cell and highly magnified; a, mouth; b, pharyngeal cavity; c, secreting tubes; d, the digestive stomach; e, the intestinal canal; f, the anus; g, retractor muscles.

Flustra, or common sea-mats, or in solid strong walls, or coral-like masses, as the *Eschæra*, or calcareous sea-mats. Each animal lives freely in its

time P. was labouring energetically to improve the cultivation of the land and the system of education. In 1770, he was created Marquis of P., and from this period to the death of the king in 1777, he was at the very height of his greatness. The accession of Joseph's daughter, Maria I.—an enemy of the minister—was immediately marked by his downfall. He was deprived of his offices; the conspirators whom he kept in prison were released; many of his institutions were abolished; and he himself was only saved from the scaffold because he held in his possession documentary proofs of the former treason of his now triumphant enemies. Maria ordered him to retire to his castle of Pombal, where he died, 8th May 1782. The peasantry always spoke of him as 'The Great Marquis,' and history has stamped the rustic verdict with its approval. When he was turned out of office, he left the queen a public purse containing 78,000,000 cruzados, and a well-ordered and flourishing state.

POME (Lat. *pomum*, an apple), a form of fruit of which examples are found in the apple, pear, and other fruits of the *Pomaceæ*; and in which the *epicarp* and *mesocarp* (see FRUIT) form a thick fleshy mass; whilst the *endocarp* is scaly, horny, or stony, and divided into separate cells, in which the seeds are enclosed. The fruit is crowned with remains of the calycine segments. Pomes have 1–5 cells, or spuriously 10 cells.

POMEGRANATE (*Punica granatum*), a fruit much cultivated in warm countries, and apparently a native of the warmer temperate parts of Asia, perhaps also of the north of Africa. It has been cultivated in Asia from the most ancient times, and is frequently mentioned in the Old Testament. It has long been naturalised in the south of Europe. In a wild state, the plant is a thorny bush, in cultivation it is a low tree, with twiggy branches, flowers at the extremities of the branches, the calyx red, the petals scarlet. It is generally referred to the natural order *Myrtaceæ*. The calyx is leathery, tubular, 5–7-cleft; there are 5–7 crumpled petals;

Section of a Pomegranate.

the fruit is as large as a large orange, with a thick leathery rind of a fine golden yellow, with a rosy tinge on one side, not bursting when ripe; the cells filled with numerous seeds, each of which is surrounded with pulp, and separately enclosed in a thin membrane, so that the P. appears to be formed of a great number of reddish berries packed together and compressed into irregular angular forms. The pulp is sweet, sometimes subacid, and of a pleasant delicate flavour, very cooling, and particularly grateful in warm climates. It is often used for the preparation of cooling drinks. A kind of P. without seeds is cultivated and much prized in India and Persia. Pomegranates have long been imported in small quantities into Britain from

Portugal and the north of Africa; but have never become an article of general demand and commercial importance like oranges. There is an ornamental variety of the P. with double flowers. The find of the fruit is very astringent, and a decoction is used as a gargle in relaxed sore throat, and as a medicine in diarrhoea, dysentery, &c. Deriving its astringency from tannin, it is used to tan leather. The finest Morocco leather is said to be tanned with it, and small quantities are imported into Britain from the north of Africa for the preparation of the finest kinds of leather, under the name of *Pomegranate Bark*.—The bark of the roots is used as an anthelmintic, and is often successfully administered in cases of tape-worm. Its value was known to the ancients, and it has long been in use in India.—The P. tree is occasionally cultivated in hothouses or greenhouses in Britain. It bears the winters of the south of England in the open air, and is very ornamental, but the fruit is worthless. In some parts of the south of Europe it is used as a hedge-plant.

POMEL, a boss or ball used as an ornament on the top of pointed roof, turret, &c.

POMERANIA (Ger. *Pommern*), a province of Prussia, bounded N. by the Baltic, E. by West Prussia, S. by Brandenburg, and W. by the Mecklenburg duchies. Area, 12,111 square miles. Pop. (at the close of 1861) 1,399,739. P. is divided into the three governmental districts of Stettin, Stralsund, and Cöslin.

This province, which is one of the lowest and flattest in Germany, and has few hills of even moderate height, is intersected by the Oder (q. v.), which forms numerous lakes and ponds, the largest of which is the Dammer Lake. The waters of this lake and of the Oder are then carried into the Stettiner Haff, from which three outlets—those of the Peene, Swine, and Dievenow—lead into the Baltic. Between these three outlets are the two islands of Usedom and Wollin. After the Oder, the chief rivers of P. are the Ihna, Rega, Persante, Wipper, and Stolpe. The shores in some parts are protected by dikes and sand-banks. The soil is generally sandy, and in many districts even stony, although near Pyritz and Stargard, on the Ploen and Maduc Lakes, and at some points of the sea-coast, it presents a tolerably fruitful character, yielding good crops of wheat, and affording rich pasture. About half of the whole area is cultivated; about a sixth is uncultivated, or under water; and the remainder is in pastures, heath, and wood. The chief vegetable products, most of which are grown in sufficient quantities to be largely exported, are—rye, wheat and other grain, flax, hemp, tobacco, and timber. Among the other exports of P. are horses, cattle, sheep, swine, geese of superior quality, feathers, butter, wool, hams, sausages, smoked poultry, &c. The sturgeon and salmon fisheries are very productive, and P. is noted for its admirable lampreys, eels, and crayfish, which are largely exported in a pickled state. The mineral products, which are inconsiderable, include bog-iron, lime, marl, alum, salt, amber found on the coast near Stolpe, and peat—which latter substance is obtained in enormous quantities, and extensively used for fuel, notwithstanding the abundant supply of wood yielded by the extensive and productive forests.

Linen and woollen fabrics, and leather, rank among the best of the industrial products; but the manufactures of P. are not of much importance. The principal branches of industry are agriculture and the rearing of horses and cattle, while the active transport-trade between the neighbouring

in her boudoir, where the most important affairs of state were settled. The choice of ministers, of ambassadors, of generals, depended on the caprice of a female; the Abbé de Bernis, the favourite of a favourite, entered the council. Foreign diplomacy turned the circumstance to account. The Austrian prime-minister induced Maria Theresa to sacrifice her pride to the exigencies of her position, and the empress-queen wrote the courtesan a letter in which she addressed her as *ma cousine*. That word turned the head of the marquise, and changed for a time the foreign policy of France. She died (15th April 1764) with the reins of government in her hands. During her life-time, immense sums from the national treasury were paid away to the marquise, and to her brother, created Marquis de Marigny. In the years 1762—1763 alone, they amounted to 3,456,000 livres. She had numerous houses and lands also given her. In 1853, M. le Roi, keeper of the town-library of Versailles, published in the *Journal de l'Instruction Publique*, a list of the expenses of the Marquise de P. during the years in which she had enjoyed the royal favour, which he had found in MS. in the archives of the department of Seine-et-Oise. They amounted to 36,000,000 livres. She was imperious and vindictive beyond measure, and with relentless cruelty doomed to perpetual imprisonment, in the dungeons of the Bastille and elsewhere, multitudes who had dared to speak about her ill-gotten gains and power. After facts like these, it is but a poor apology for the marquise to say that she encouraged savans, poets, and philosophers, patronised and protected the *Encyclopédie*, and aided in the expulsion of the Jesuits. The *Mémoires* and *Lettres* published under her name are spurious.

POMPEII, a city of Campania, was built at the mouth of the river Sarnus (*Sarno*), looking out on the Bay of Naples. It stood at the base of Mount Vesuvius, between Herculaneum and Stabia. Of its early history little is known (legend ascribed its foundation to Hercules); but in more recent times it became a favourite resort for wealthy Romans, many of whom, including Cicero, had villas in the suburbs. It must have been at one time a place of considerable trade, since it was the port-town of Nola and other inland cities which studded the fertile valley of the Sarnus. The city was much damaged by an earthquake which happened on the 5th February 63 A.D., and not many years had revolved when the great and final calamity overtook it. In 79 A.D. occurred that terrific eruption of Vesuvius which, in one day, overwhelmed in irremediable ruin the towns of P., Herculaneum, and Stabia. In course of time a small village rose at or near the spot; but by and by the memory of P. was forgotten, and for centuries its very site was unknown. The difficulty of discovering its true position was increased in consequence of the changes produced by this fearful convulsion, which had hurled back the Sarnus from his ancient course, and raised the sea-beach to a considerable height, so that the rediscovered city, to which merchantmen resorted of old, is now a mile from the coast, and a considerable distance from the stream that in ancient times was wont to skirt its walls. For more than sixteen hundred years, P. lay undisturbed beneath heaps of ashes and cinders. At length, in 1689, some ruins were noticed, but it was not till 1755 that any excavations were made. These operations, begun by the Neapolitan government, have been continued till the present time (and recently with increased energy), and have been exceedingly productive of objects which interest the antiquarian and the classical scholar. The remains found are in a remarkably

good state of preservation, owing to the fact that the city was destroyed not by lava, but by showers of sand, ashes, and cinders (*lapilli*), forming a light covering, which found its way into every nook, and, as it were, hermetically sealed up the town. It would appear that in some parts at least the matter was deposited in a liquid state, and so flowed into the remotest cellars of the doomed habitations. The immense volumes of water which poured down, mixed with the ashes that had already fallen and with those that were still suspended in the air, and formed a kind of liquid mud. This is proved by the discovery of the skeleton of a woman in a cellar, 'enclosed in a mould of volcanic paste, which received and has retained a perfect impression of her form.' The depth of the superincumbent rubbish is in most places about 15 feet, but this mass has not been heaped up at one eruption. That it is the work of many eruptions is proved by the facts: (1) That as many as eight or nine different layers have been distinctly counted; and (2) That, while the upper layers are undisturbed, the lower one has evidently been moved. Comparatively few skeletons have been found, and almost no objects of great intrinsic value, such as gold and silver plate, which seems to shew that the great body of the population had found time to escape, and had returned to seek and to bury their lost friends, and to recover whatever treasures could be found. In the autumn of 1864, in excavating a temple of Juno, upwards of two hundred skeletons were found lying on the floor, the victims having evidently gone thither to seek the protection of the goddess. The plan of P. seems to have been regular, the streets (the broadest of which yet discovered is only 30 feet) crossing one another at right angles. The houses were plain and low, being seldom more than two stories high, and had all their good apartments on the ground-floor. The city was about two miles in circumference, and was surrounded by a wall. It would be impossible in our brief space to attempt even an enumeration of the objects discovered in this now famous city, or to detail the valuable results which have flowed from the work of excavation. Suffice it to say that in all the departments of social life—in the affairs of domestic and of public life, of the worship of the gods, and the shows of the arena—in architecture, painting, and sculpture—in fine, in all the appliances of comfort and of luxury in a wealthy community, we have, as it were, a living picture of a city 1800 years ago. The reader who wishes fuller information should consult Mazois' work, *Les Ruines de Pompeii* (Paris, 1812—1839); Breton's *Pompéie* (Paris, 1855); Overbeek's work (Leipzig, 1856); Sir W. Gell's well-known *Pompeiana* (4 vols. 1824—1830); and *Pompeii* (2 vols. 1831) in the series of the Society for the Diffusion of Useful Knowledge. For a popular account of the present state of P., we may refer to *Something of Italy*, by W. Chambers, 1862.

POMPELMOOSE, or POMELO (*Citrus pomelo*), a fruit nearly resembling the Shaddock (q. v.), of which, perhaps, it ought to be esteemed a variety, although it is now distinguished by some botanists as a separate species. It is large and pale yellow. It has long been cultivated in the East Indies, and has recently been introduced into many warm countries. It has become an article of importation into Britain, and is frequently to be seen in fruit-shops. In pleasantness of taste, it resembles the best oranges. It is often preserved with wine and sugar, when it is very agreeable and refreshing in a hot climate. The rind is often candied.

POMPEY THE GREAT. Cneius Pompeius

PONCE DE LEON—PONDICHERRY.

PONCE DE LEON, FRAY LUIS, a celebrated Spanish poet, was born in 1527, probably at Granada. In 1544 he entered the order of St Augustine at Salamanca, where he studied, took his degree in theology in 1560, and was appointed professor of the same in 1561. The reputation that he acquired as a learned commentator on the Bible induced some persons, who were envious of his success, to accuse him of having disregarded the prohibition of the church, inasmuch as, at the request of a friend, he made a new translation of the Song of Solomon, and brought out prominently, in his arrangement of the verses, the true character of the original—viz., that of a pastoral eclogue. This interpretation was not that adopted by the Catholic Church, and P. was summoned, in 1572, before the formidable tribunal of the Inquisition at Valladolid to answer the charges of Lutheranism, and of translating the sacred writings contrary to the decrees of the Council of Trent. The first accusation he quickly disposed of—for he had in reality no inclination to a foreign Protestantism; but the second was undoubtedly true, and P. was imprisoned. After five years he was released through the intervention of powerful friends, and was even reinstated in his chair at the university with the greatest marks of respect. The numerous auditory that assembled to witness the resumption of his lectures, were electrified when P. began with these simple words: 'As we observed in our last discourse'—thus sublimely ignoring the cause and the duration of his long absence from his lecture-room. In 1580, P. published a Latin commentary on the Song of Solomon, in which he explained the poem directly, symbolically, and mystically; and, therefore, as obscurely, says Mr Ticknor, 'as the most orthodox could wish.' P. lived 14 years after his restoration to liberty, but his terror of the Inquisition never quite left him, and he was very cautious in regard to what he gave to the world during his lifetime. He died in 1591. P.'s poetical reputation was wholly posthumous, for though his *De los Nombres de Christo* (on the Names of Christ), (Salamanca, 1583—1585), and *La Perfecta Casada* (The Perfect Wife), (Salamanca, 1583), are full of imagery, eloquence, and enthusiasm, yet they are in prose. His poetical remains were first published by Quevedo at Madrid in 1631, under the title, *Obras Proprias, y Traducciones Latinas, Griegas y Italianas: con la Paraphrasi de Algunos Salmos y Capítulos de Job*, and have since been often reprinted. These consist of translations from Virgil's *Eclogues* and the *Georgics*; from the *Odes* of Horace, and other classical authors, and from the Psalms. His original poems are few, but they are considered among the most precious in the author's language, and have given P. a foremost place among the Spanish lyrists. According to Ticknor: 'Luis de León had the soul of a Hebrew, and his enthusiasm was almost always kindled by the reading of the Old Testament. Nevertheless, he preserved unaltered the national character. His best compositions are odes composed in the old Castilian versification, with a classic purity and a vigorous finish that Spanish poetry had never till then known, and to which it has with difficulty attained since.' See Nicolas Antonio, *Bibliotheca Hispana Nova*; Ticknor, *History of Spanish Literature*; and Villemain, *Essais sur la Poésie Lyrique*.

PONCHO, an important article of male attire in Chili. It consists of a piece of woollen cloth, 5—7 feet long, 3—4 feet broad, having in the middle a slit through which the wearer passes his head, so that the poncho rests upon the shoulders and hangs down before and behind. In the fashions of recent times, the poncho has been introduced in Europe.

PONDICHERRY, the chief of the French settlements in India, situated in the district of South Arcot, in the Madras Presidency. The other French establishments are Mahé in Malabar, Karikal (q. v.) in Tanjore, Yanum in Godavari, and Chandernagore (q. v.) in Bengal. The extent of the united territories is given by M. Block at 188 square miles. P. is situated on the Coromandel Coast in 11° 56' of N. lat., and 79° 52' of E. long., and is 98 miles from Madras. The territory of P. is divided into three districts—Pondicherry, Vellalore, and Bahour—has an area of 107 square miles, and comprises 92 villages. The total population of the French establishments in India in 1840 was reckoned at 171,217; in 1863, it amounted to 221,507. The population of the town of P. in 1854, was 96,716, or 1641 Europeans and 95,075 natives. The governor of P. is the governor-general of the French possessions in India; his income is 40,000 francs a year. The salaries of the *chefs de services* of the other establishments are as follows: Chandernagore, 16,000 francs; Karikal, 10,000 francs; Yanum, 8000 francs; Mahé, 8000 francs per annum. The governor of P. has a council consisting of the *ordonnateur*, the *providenceur-général*, and the *contrôleur colonial*. The French army in India consists of two companies attached to the 1st marine regiment of infantry, consisting of 276 men, commanded by six European officers. The spinning of cotton and the fabrication of cotton-thread are the chief manufactures in the French establishments.

History.—The first settlement of the French in India was at Surat, in 1668. The chief of the French East India Company at that time was Caron. Subsequently, he took Trincomalee from the Dutch; but they were not long in repossessing themselves of it. Caron then turned to the Coromandel coast. In 1672, he took from the Dutch St Thomé, a Portuguese town (now a suburb of Madras); but two years later, the Dutch retook this place also. It was then that François Martin collected about 60 Frenchmen and settled them in P., which, in 1674, he had purchased, with the surrounding territory, from Gingee, who had the supervision of all Sivajee's conquests in the country. The Dutch took the town in 1693; but by the treaty of Ryswick it was restored to the French in 1697. Chandernagore was ceded to the French in 1686 by Aurungzebe. In 1727, they obtained the cession of Mahé; in 1739, they purchased Karikal from the king of Tanjore; and in 1752, Yanum was ceded to them. Dupleix was governor of P. when war broke out between France and England; and in 1746 La Bourdonnais took Madras. In 1748, Admiral Boscawen besieged P., but two months later, was compelled to raise the siege. In the same year occurred the peace of Aix la Chapelle; but it did not put an end to hostilities in India till some time later. In 1757, war recommenced. In 1758, Count de Lally became governor-general, and attacked the English settlement of Fort St David, which surrendered, and was totally destroyed. In 1761, Eyre Coote took Pondicherry. By the peace of Paris, P. was restored to the French in 1763 with reduced territory, and also Mahé, Karikal, and Chandernagore. P. was again taken by the English under Sir Hector Monro in 1778, and restored in 1783. In 1793, the English again repossessed themselves of it, but the treaty of Amiens in 1802 again restored it, but only till the following year. From this time it was held by the English till, by the treaties of 1814 and 1815, it was for the last time restored to France, reduced to the narrow limits assigned by the treaty of 1783.

Annexed is a statement exhibiting some particulars relative to such of the present French

nature could no longer bear up, and he sank to rise no more, October 19, 1813. His body was recovered six days after, and was embalmed and carried to Warsaw, whence it was afterwards removed to Cracow, and placed beside the ashes of Sobieski and Kosciuszko.

PONT-A-MOUSSON, a town of France, department of Meurthe, on the railway from Nancy to Metz, 20 miles north-north-west of the former of these towns. The Moselle flows through the town, which is situated in a fruitful valley. There is a fine Gothic church dedicated to St Martin. P. has some manufactures of pottery. Pop. 6437. It was the birthplace of Marshal Duroc, the favourite and friend of Napoleon.

PONTCHARTRAIN, LAKE, in Louisiana, U.S. America, about 5 miles north of New Orleans, with which it communicates by a canal, is 40 miles long, and 24 miles in extreme width. It is navigated by small steamers, and communicates on the east with the Gulf of Mexico, and on the south with the Mississippi. Its greatest depth is from 16 to 20 feet.

PONTECORVO, a city of southern Italy in the province of Caserta, situated on the river Garigliano, 37 miles north-west of Capua, with 9314 inhabitants, almost all engaged in agriculture. It has an old castle, many churches, and is a bishopric. It formerly belonged to the pope; but now, since 1860, it forms part of the kingdom of Italy, and is a sub-prefecture. Napoleon I. gave the title of Prince of Pontecorvo to Marshal Bernadotte, afterwards king of Sweden.

PONTÉ DELGADA, a town on the south coast of the island of St Michael, one of the Azores (q. v.), in lat. 37° 40' N., and long. 25° 36' W. It is defended by the Castle of St Braz, which can mount 90 pieces of cannon, and by the forts of São Pedro and Rosto de Cão. The anchorage in the roadstead is bad and the harbour is shallow, but still the trade (which is largely in the hands of English merchants) is the most considerable of all the towns in the Azores. The chief exports are wheat, maize, and oranges. Pop. estimated differently from 16,000 to 22,000.

PONTEFRAC (commonly pronounced *Po'm-fret*), a market-town and municipal and parliamentary borough, in the county of York, and 24 miles south-west of the city of that name, on the Lancashire and Yorkshire Railway. There are two churches, viz. St Giles and All-Saints, the latter is in the Early English style, and has a handsome tower. There are a grammar, as well as national and other schools, several almshouses, a large work-house built in 1864, a splendid market hall opened by Lord Palmerston in 1860, &c. In the vicinity are extensive gardens and nurseries. Eight fairs for the sale of cattle take place annually. The trade is chiefly in corn, liquorice, and malt. Two members are returned to the House of Commons for the borough. Pop. (1861) of municipal borough, 5346; of parliamentary borough, 11,736.

The castle of P., built shortly after the Conquest, was a large and strong edifice, and stood on a commanding height. It was the scene of the imprisonment and death of Richard II., and here also Rivers, Grey, and Vaughan were put to death, at the instigation of Richard III. The remains of the castle to be seen at the present day are very meagre.

PONTEFRAC CAKES are small lozenges of refined liquorice, which have for centuries been made at Pontefract, and are much esteemed. They

are impressed with a rude figure of a castle, intended to represent Pontefract Castle.

PONTEVEDRA, a town of Spain, province of Galicia, is situated on a peninsular slope near the mouth of the river Lerez, 35 miles south of Santiago. P. is a clean and pretty place, with high old walls, granite-built houses, broad streets, and pleasant arcades. It takes its name from the bridge (*Pons Vetus*) that spans the river. The Pontevedrans are engaged chiefly in agriculture, though sea-fishing is also carried on, and there are some manufactures. Pop. 6623. The neighbourhood, of which charming views are obtained from parts of the town, is covered with villas, farms, and woodlands.

PONTIANAK, the capital of the kingdom of the same name on the west coast of Borneo, is situated near the junction of the Landak and Kapuas. It is built on both banks of the river, which is 900 feet broad, and thence to the sea is called the Pontianak. The city derives its importance from being the seat of the Netherlands' Resident, who rules directly and indirectly over the whole west coast, from 2° 56' S.—2° 50' N. lat., and 108° 45'—112° 50' E. long.; territories rich in vegetable and mineral wealth. The Residency is near Fort Du Bus, in 0° 2' N. lat., and 109° 1' 30' E. long.; other principal buildings being the sultan's palace, the mosque, and hospital. Pop. 7000, but rapidly increasing. Trade is the only pursuit in the town; and the rich alluvial lands are partly cultivated with rice, sugar-canes, cotton, indigo, coffee, provisions, and fruits.

Besides a number of small dependencies, the Netherlands' Resident at P. governs the important kingdoms of Landak, Mampawa, and Sambas, with the mining district of Montrado, in the north; Tayang, Simpang, and Matan or Succadana, to the south; and Sangouw, Sekadouw, and Sintang, in the interior. The produce consists of diamonds, gold, coal, tin, iron, wax, edible nests, pepper, gutta-serena, &c. There are many gold mines in Montrado and other districts; rich iron ores in Matan; gold, platina, copper, &c., in Sambas; and in former times, Landak was rich in diamonds, but the produce is now trifling. In this district was found the famed diamond of the Sultan of Matan, which weighed 367 carats. The annual produce of the mines in the Residency of P. is estimated at not less than 425,000 ounces of gold. In 1860, pop. 319,962, of whom 104 were Europeans, 24,080 Chinese, 294,123 natives, &c.

In 1856, the Dutch imports and exports were: P.—imports, £73,330; exports, £37,297. Sambas—imports, £18,312; exports, £25,267. In-bound ships at P. had a burden of 4083 tons; at Sambas, 2012½ tons: the outward-bound nearly the same. The other Netherlands' possessions in Borneo are called the Residency of the South-east Division, including the lands from Matan, in the south-west, along the south and east coasts to 0° 50' N. lat. The Resident's house is at Banjermassin, in the island of Tatas, 15 miles from the mouth of the Banjer, in 3° 34' 40" S. lat., and 114° 30' E. long. Pop. 30,000. The exports are—pepper, diamonds, gold-dust, coal, benzoin, wax, ratans, dragon's-blood, camphor, edible nests, iron, fire-arms, &c. Imports—piece-goods, powder, knives, opium, rice, salt, sugar, Chinese porcelain, silk-stuffs, corals, pearls, &c. The coal-mines of Orange-Nassau produced 15,979 tons in 1855. In 1861, on account of war between the natives and Netherlands, it had fallen to 1839 tons. In 1856, the imports at Banjermassin amounted to £89,566, and the exports to £61,802. The inbound ships had a burden of 12,858½ tons, and out-bound nearly the same. At Nagara, a town of 10,000 inhabitants, in Banjermassin,

but nothing was really accomplished till the time of Pope Pius VI., who, in 1778, commenced to drain the marshes, and completed the drainage in ten years. The reclamation of the land, however, has been found possible only in part. Though much is under cultivation and in pasture, a great portion is hopelessly sterile; and the whole region is so unhealthy, that, in the summer months, the inhabitants are obliged to remove to the neighbouring mountains.—The famous Appian Way (q. v.) went through the P. M.; and after being unused for centuries, was re-opened by Pius VI.

PONTOON (through the French *ponton*, from the Latin *pons*, a bridge), the name given to buoyant vessels used in military operations for supporting a temporary bridge. Pontoon bridges have been constructed, with greater or less skill, from the earliest times. Darius passed the Hellespont and Danube by pontoon bridges, and the former was traversed by Xerxes' immense army on similar temporary bridges, very admirably formed. A pontoon train is a necessity for every army manœuvring in a country where there are rivers, and many campaigns have proved failures from the want of this cumbersome but indispensable apparatus. In most armies, the pontoons are under the charge of the engineers; but in the Austrian army there is a distinct and highly-trained corps, called *Pontonieren*. Marlborough used clumsy wooden pontoons. Napoleon and Wellington had them lighter of tin and copper. They were flat-bottomed, rectangular boats, open at the top. Anchored at stem and stern, beams were laid over from one to another, and transoms with planks crossing these beams completed the roadway of the bridge. These open pontoons were exposed to the disadvantage that they were very liable to be filled with water, and thus ceased to support the bridge. They were, moreover, very heavy, one pontoon, with appurtenances, constituting a wagon-load. As 36 were deemed necessary for the train, a pontoon equipment was a serious item in the *impedimenta* of an army. The open pontoons are now, however, obsolete, modern science having substituted closed cylindrical vessels of copper (or occasionally of India-rubber), which are far lighter, can in an emergency be rolled along, and can only be submerged if perforated. Against the last contingency, they are divided within into water-tight compartments, so that one perforation may not seriously detract from the total buoyancy of a pontoon. In the British service, two pontoons are used: the larger, with hemispherical ends, being 22 feet 3 inches in length, and 2 feet 8 inches in diameter; the smaller, cigar-shaped, with conical ends, 15 feet in length, and 1 foot 8 inches in diameter. Two of the largest used to form a raft weigh 8 cwt. 7 lbs.; the superstructure, 18½ cwt. At 24 feet apart from centre to centre, this raft, will carry infantry four deep, marching at ease; cavalry, two deep, and light field-guns; at 16 feet interval, heavy guns. A raft of three pontoons, at close distances, will support siege-ordnance. The pontoons can be used in very wide rivers as rafts, in their proper sense, or they can be connected, when the width permits, to form a bridge. In the latter case, each is towed into line, anchored above as it drops to its place, and a second time when its exact spot is reached. It is computed that each pontoon requires 1½ minutes to take its position, and that when the pontoons are placed, the roadway can be laid, if properly arranged previously, in 1½ minutes for each interval between two pontoons. A river of 600 feet may thus be bridged in less than 1½ hours. The process of throwing a bridge over in face of an enemy, is fraught with the utmost danger to the engineers employed.

Pontoon bridges have to be passed with great care, and every measure should be adopted, as breaking step, &c., which can reduce the peculiarly dangerous vibration.

PONTUS, the name given by the ancient Greeks to a country in the north-east of Asia Minor, bordering on the Pontus Euxinus (whence its name), and extending from the river Halys in the west to the frontiers of Colchis and Armenia in the east. Its southern limits were the ranges of Anti-Taurus and Paryadres, so that it corresponded pretty nearly to the modern pashaliks of Trebizond and Siwas. On the east and south, P. is mountainous, but along the coast there are large and fertile plains, which in ancient times produced, and indeed still produce abundance of grain, fruits, and timber. Game, according to Strabo, was also plentiful. The rearing of bees was carefully attended to, and honey and wax were among the chief articles of commerce. Iron was the principal mineral.

Regarding the ancient inhabitants of P., nothing is known ethnologically. Greek colonies, indeed, flourished on the coast from the 7th c. B.C., and doubtless spread some knowledge of civilisation among the inland barbarians; but how far the latter were influenced thereby, we cannot tell. They first appear as divided into numerous tribes, virtually independent, but owing a nominal allegiance to the Persian kings, whose authority was represented by a hereditary satrap belonging to the royal family of Persia. It was one of these satraps, Ariobarzanes, who, by subjugating some of the Pontian tribes, in the year 363 B.C., during the reign of Artaxerxes II., laid the foundations of an independent sovereignty. Ariobarzanes succeeded in 337 B.C. by Mithridates II., who took advantage of the civil confusions that followed the death of Alexander the Great, to enlarge his dominions; but the greatest of these Pontine sultans, and one of the most formidable enemies that Rome ever encountered in the east, was Mithridates VI. (q. v.). On the overthrow of this potentate by Pompey (65 B.C.), the western part of P. was annexed to Bithynia, and the rest parcelled out among the neighbouring princes. Subsequently, a grandson of Mithridates, Polemon, was installed monarch of the central part of P.; but in the reign of Nero, it was voluntarily ceded to the Roman emperor, became a Roman province, and was called *Pontus Polemoniacus*. In the reign of Constantine, it underwent a new division. The principal towns of ancient P. were Amisus, Polemonium, Pharnacia, Cerasus, Trapezus, Apearus, Cabira, and Neocæsarea.

PONTYPOOL, a small market-town of Monmouthshire, 20 miles west-south-west of Monmouth, and 10 miles north of Newport, with both of which it is connected by railway. Japan wares were long made here, but this branch of manufacture has declined. Articles in polished iron are made, and the iron forges and coal and iron mines which surround the town employ many of the inhabitants. Pop. (1851) 3708; (1861) 4661.

PONY, the common name of many small active breeds of Horse (q. v.), belonging to different countries, from India and Africa to Iceland; but in the warmer parts of the world, chiefly found in mountainous or sterile regions. They are in general the property of man, and not truly wild, although, in very many cases, they live almost in a wild state, and receive no care or attention except when they are wanted for use. They are in general very hardy, and their strength is great in proportion to their size. They are often vicious, or at least playfully tricky to a much greater degree than is usual with larger horses. Ponies are very often covered

stones, but the trade in these things has quite ceased. The native manufactures have also been supplanted by the introduction of European piece-goods, and the only business that prospers is that of dealers in grain and other agricultural produce. The railway has rendered P. almost a suburb of Bombay. The works by which the railway climbs up the great mountain-barrier of the Ghauts from the low lands of the Konkan to the high table-land of the Deccan are among the boldest that have as yet been undertaken. The line up the Ghauts was opened in April 1863.

At present, great alterations are taking place around Poona. The native city has not of late years greatly altered, except that the streets have been widened and cleaned; but the cantonment is changing rapidly. The number of new buildings reared within the last three or four years is very great. Among the most striking of these will be, when it is finished, the Government College—a Gothic building, erected mainly at the expense of Sir Jamsetjee Jeejeebhoy. While speaking of education in Poona, it is but fair to the Scottish mission to say that it commenced English education in P. soon after the mission was established (in 1831), and has all along carried it on. The schools of the mission, both male and female, both for English and the vernacular (Marathi), are largely attended, even by the highest castes. The female pupils are upwards of 300 in number; and one school consists of Musulman girls. The Musulmans in India generally are far behind both Hindoos and Parsees in their desire to educate the females; in fact, a Musulman female school is as yet exceedingly rare.

POONA-WOOD is the timber of the Poon trees of India (*Calophyllum inophyllum* and *C. augustifolium*). It is very commonly used in the East Indies, particularly in ship-building, for planks and spars; these latter are usually called *Poon*, and are in general use for masts in that country. The trees are natives of Penang, and of the countries eastward of the Bay of Bengal.

POOP, in large vessels, is a sort of supplemental deck raised over the after-part of the upper deck. The best cabins are situated beneath it. In old ships, a second and even a third poop were raised above the hinder part of the poop proper, giving the vessels that immense height at the stern which is shewn in old drawings. The poop is gradually disappearing from ships built either for speed or war, as offering undue resistance to the wind in one case, and an undesirable mark to an enemy in the other.

POOR AND POOR-LAWS. Charity, like Christianity, had its origin, or earliest development, in the East. Among the primitive nations of the world, almsgiving was inculcated as a religious observance, and is prescribed as such in their sacred records. Among the European nations of antiquity, we find a provision for the poor adopted as a matter of state policy. In early times, Athens could boast of having no citizen in want; 'nor did any disgrace the nation by begging.' But war, at length, brought poverty in its train, and the Athenian people decreed the maintenance of those who were mutilated in battle; and, at a later period, of the children of those who fell. Plutarch mentions Peisistratos as the originator of the first decree, though others derive it from Solon. By the latter decree, the state provided for the orphans of its soldiers up to their eighteenth year, and then sent them into the world with a new suit of armour. The bounty given to the disabled is mentioned by Lysias, Harpocratian, Aristotle, Isocrates, and others; and is variously stated at one, two, and

three oboli a day, and it seems to have been increased with the increased cost of subsistence. There were also societies for the relief of distress among the democratic states of Greece, called *Eranoi*—a sort of friendly society, in which the members relieved were expected to pay back the money advanced to them, when they had raised themselves to better circumstances. But it must be remembered that these so-called democratic states were in reality slave-holding aristocracies.

Among the Romans, the Agrarian and Licinian laws (years of Rome 268 and 338) were framed in order to prevent the extremes of riches and poverty in the state. They limited the extent of property in public land to be held by each citizen, and the latter directed that all such land, above the allotted portion, should be taken away from the holders, and given to those who had none. The distribution of grain at reduced prices, which at length became gratuitous, was introduced by Caius Gracchus, and lasted till the fall of the Roman empire. Augustus in vain tried to suppress it. In his time, 200,000 citizens were thus fed. Cicero makes mention of this provision as in great favour with the Roman people, because it furnished them with an abundant subsistence without labour; other Roman writers describe its results as disastrous both to agriculture and manners, creating a nation of mendicants, and causing the land to fall out of cultivation.

In the middle ages, the great body of the labouring classes were in a state of bondage, and looked to their feudal lords for maintenance. The obligation to provide for their slaves, or serfs, seems to have been fully recognised, so that many encountering, in a state of freedom, the miseries of want, went back to bondage as a refuge from destitution. The villeins in Saxon England were attached to the soil, and received from their lord a portion of land for the support of themselves and their families. But the church of Rome constituted herself the great receiver and dispenser of alms. The rich monasteries and abbeys distributed doles to the poor. Fuller, in his *Church History*, says that these alms 'made and maintained the poor,' so that beggary became a trade to which an apprenticeship was served; and Mr Hallam, in his *Constitutional History*, says the blind eleemosynary spirit of the church 'was the cause, not the cure of beggary and wretchedness.'

In the Catholic states of Europe at the present day, the church still remains, to a great extent, the public almoner. In Rome, a Commission of Alms has the general direction and administration of the principal public charities. It is composed of a cardinal-president and 15 members, among whom is the pope's chaplain. The city is divided into twelve districts, over each of which a member of the central council presides. Each parish is represented by its curé and two deputies—a layman and a *dame de charité*, named for three years—and has a secretary and a steward or treasurer, who are paid. The alms are given in money, tools, and clothes. Requests for assistance are addressed to the parochial body, from which they are sent to the district, and thence to the central council. The more urgent cases are referred to the cardinal-president, or the curé of the parish. Three brotherhoods search out cases of hidden poverty; and not only do all the religious associations, convents, and monasteries distribute relief, but there is hardly a noble or wealthy house which does not take a regular part in the assistance of the poor.

In Spain, the state supports several asylums for lunatics, the blind, and deaf and dumb. It also distributes a large sum annually among the provinces for the relief of the poor—each province being bound

most unjust and absurd restrictions on the freedom of labour. The 23d Ed. III. forbids giving alms to vagrants, on pain of imprisonment; then also the laws of settlement had their origin in the attempt to chain the free labourer to the land. See SETTLEMENT. The 12th Richard II. (1388), c. 7, is the first statute that makes provision for the impotent poor. The statutes of Henry VII. endeavour to carry out, by the severest measures, the system of repression. The 27th Henry VIII., c. 25 (1535), introduced the principle of compulsory assistance, though it was by way of voluntary alms. Each parish was ordered to receive and provide for the impotent, and set the able-bodied to work. Alms were to be collected into a general fund, and indiscriminate almsgiving was forbidden, on pain of forfeiture of ten times the value given. The sturdy beggar was treated without mercy, was to be whipped when first caught, next to have his ear cropped, and for a third offence, to suffer death, as a felon and enemy to the commonwealth. This is repealed by 1st Ed. VI., c. 3 (1547), because, 'through foolish pity, it is rendered of non-effect.' Not much milder, to modern ideas, seem the substituted penalties—viz., branding, on first conviction, with a V on the shoulder, and being adjudged a slave for two years, to be claimed by any one, fed on bread and water, and caused to work by beating, &c. Running away from this tender treatment was punishable with S branded on the face, and slavery for life to the town or parish, on the roads of which the incorrigible vagrant was to work in chains, at the penalty of the town or parish. Other two acts of Edward's reign return to earlier and considerably milder measures of restraint. A little urging was now found necessary to obtain funds for the maintenance of the poor. The collectors were gently to ask every man and woman at church what they would give; but if one could not be persuaded, the bishop was to send for the recusant, and use 'charitable ways and means.' At length, the 5th Elizabeth c. 3 (1563), provided that he who obstinately refused to give should be handed over to the more persuasive arguments of the justices, who were empowered to tax him at their discretion, and send him to jail for default. Ten years later, the power of compulsory assessment is given to the justices, and abiding-places are ordered to be provided for the aged and infirm. These statutes culminated in the 43d Elizabeth, c. 2 (1601), which has formed the basis of the poor-law system of England up to the present time. It taxed every inhabitant of every parish for the relief of the poor. It directed the justices in every county to appoint three or four substantial householders in each parish to be overseers of the poor, along with the churchwardens. It ordered the relief of the impotent, and the apprenticing of children, and the providing of work for the able, by means of 'a convenient stock of flax, hemp, wool, thread, iron, and other necessary ware and stuff.' The great act of Elizabeth came but slowly into operation. Up to the reign of Charles I., there were many parishes in which no rate was assessed, and which turned away their poor; but the great evils had been remedied, and there is little legislation on the subject for the next hundred years. The 3d William and Mary, c. 2 (1691), an act relating chiefly to settlement, provides that the persons to be relieved be registered and examined by the vestry, because evils had arisen out of the unlimited power of the churchwardens and overseers giving relief 'for their own private ends,' by which the charge on the parish was greatly increased, contrary to the true intent of the statute of Elizabeth. This act also gave power to the justices to order relief in cases of emergency, a

provision which afterwards became a fruitful source of difficulty. The evils henceforth complained of were, that many had thrown themselves on the rates who ought to have been supporting themselves independently of such aid; that pauper labour was found interfering with and displacing industrial labour; that the overseers were acting with unchecked dishonesty; and justices, with unrestrained liberality, ordering the money of the industrious and prudent to be spent upon the idle and improvident. Efforts were made to remedy these abuses throughout the reigns of the first three Georges, by making the justices act with the overseers, by rendering the overseers accountable to the parishioners by means of returns and the power of inspection, and by the offer of the workhouse to all applicants for relief. This last provision, made in the reign of George I. (9th Geo. I., c. 7, 1723), substituted what is called in-door relief, for the allowance made to the poor at their own homes and introduced the workhouse system. All who refused to be lodged in the house, were to be struck off the poor's-roll, and refused relief. A great increase in the number of workhouses took place; guardians were appointed to guard the pauper children from neglect and improper conduct, and other attempts to improve their administration made; Work-house Unions were also introduced by an act called Gilbert's Act (1782), and a succession of acts passed for the protection of parish apprentices. Towards the close of the 18th c. a great relaxation took place in the treatment of the poor. The 36th Geo. III., c. 10 and 23 (1796), increased the amount, and extended the application of relief. It repealed the act forbidding relief to those who refused the workhouse, and allowed relief to be given in aid of wages. Henceforth, out-door relief became the rule under a variety of systems, of which the complaint was justly made, that they turned the poor-laws into a mode of paying wages. In 1801, the amount of the rates was reckoned at £4,000,000. In 1820, it had risen to £7,330,254. In 1817, a commission of the House of Commons stated their opinion, that, unless checked, the assessment would swallow up the profits of the land. Though the two Vestry Acts, which resulted from the commission appointed in 1817, seem to have done something to remedy the evils complained of, a new commission to inquire into the operation of the poor-laws was found necessary, and appointed in February 1832. The evidence brought before this commission revealed a disastrous state of things. The independence, integrity, industry, and domestic virtue of the lower classes were in some places nearly extinct. The great source of the evil was shewn to be the relief afforded to the able-bodied on their own account, and that of their families, in aid of wages. This aid at first reduced the expenditure in wages, and found favour with farmers and magistrates, who framed scales of relief in accordance with the wants of the people, so that they began to be paid for their necessities, and not for their industry, and fell into the temptation of increasing the former, and neglecting the latter. Five modes of out-door relief were found in operation: 1. Relief without labour; 2. Allowance given, in aid of wages, according to the number of the labourer's family; 3. The Roundsmen system, the labourers being let out, by the parish, among the employers round; 4. Parish work, generally on the roads; 5. The labour-rate, the ratepayers preferring to divide among them the pauper labour, and to pay for it, however valueless, instead of raising a rate. Diminished industry ate away the very root of capital. Farmers turned off their men, or refused to employ them at fair wages, thereby causing a surplus of unemployed

POOR.

of 4s. 9½d. per head on the average population of the period, apportioned as under :

	Amount of Assessment.	Per head per annum.
England and Wales, . . .	£ 54,767,542	5 9½
Scotland,	5,917,634	3 11½
Ireland,	6,656,745	2 1½

The rate, which in the year ending 25th March 1861, was 5s. 9d. per head on the population, amounted to £5,778,943, rose in 1862 to 6s. per head, amounting to £6,077,927, and in 1863, to 6s. 4½d., amounting to £6,527,036. The reports for these years shew that this increase is entirely due to the distress in the cotton manufacturing districts.

There is no poor-law in our Australian colonies, but benevolent asylums for the infirm and destitute have become general, and hospitals are numerous in all the rising towns in the gold-fields.—Compare Büchh's *Public Economy of Athens*, translated by Sir G. C. Lewis ; M. Dureau de la Mall's *Economie Politique des Romains ; Report of the International Statistical Congress* (1862) ; *Dictionnaire de l'Administration Française* (Paris, V. Berger-Levrault et Fils) ; Sir George Nichol's *History of the Poor-laws ; Report of the Poor-law Commissioners* (1835) ; *Reports of the Poor-law Commission and Poor-law Board from 1835 to 1862*.

POOR, GENERAL LAWS AS TO. The fundamental rule as to the relief of the poor is, that each parish in England and Wales is bound to maintain its own poor. For the purpose of providing the requisite machinery, overseers are required to be appointed in each parish every year on the 25th March, or within a fortnight following ; and these, along with the churchwardens, who are *ex officio* overseers, have the duty of providing the requisite funds. See **OVERSEERS**. This is done by means of a poor-rate, which the churchwardens and overseers may levy on all the occupiers of land in the parish, after such rate has been confirmed by the justices. The rate specifies a certain sum in the pound which is to be levied, and the annual value of the various lands is then specified, and the amount is thus easily computed. The rate is thus a local tax on the occupier of the land, and not on the owner, unless he himself is also occupier. In all cases, the duty of raising the funds attaches to the overseers ; but the actual distribution and application of them are not always in their immediate control. Owing to the mischiefs arising from the officials of each parish distributing the funds at their discretion, without uniformity of plan, a central controlling power was created in 1834, in the shape of the Poor-law Board ; and authority was given to combine various parishes into one poor-law union, for the purpose of greater uniformity as well as economy. When a union is formed, the control of the expenditure is chiefly vested in the guardians of this union, who are elected by each parish, and who supervise the management of the union workhouse. They order the overseers of each parish to raise their due proportion of funds, by a contribution order issued to such overseers, who are thereon bound to levy the amount by including it in the next poor-rate. The guardians are bound to contract for the provisions, clothing, fuel, &c., supplied to the workhouse, by means of sealed tenders, unless the quantity is less than a stated amount. They pay all the expenses of prosecutions for disobeying the orders of the Poor-law Board and kindred offences. The principle on which relief is administered to the poor is, that the condition of the pauper should not be so comfortable as that of the lowest independent labourer ;

otherwise, idleness and imposture would be encouraged to an indefinite extent. The guardians profess only to relieve destitution already existing, and not to enable persons to keep off impending destitution. Hence they only supply the bare necessities of life. They cannot, for example, advance or lend money to set up a poor person in trade. Minute regulations are contained in the consolidated orders of the Poor-law Board as to the classification of paupers in the workhouse, mode of admission, diet, discipline, and out-door relief. With regard to out-door relief and able-bodied paupers, it is provided, that every able-bodied person requiring relief from any parish, shall be relieved wholly in the workhouse, together with his wife and family, if any, and if not otherwise employed. But the relief may be given out of doors in cases of sudden and urgent necessity, of sickness, accident, and a few other cases. In general, relief is confined to persons actually residing in some place within the union, except in case of casual destitution, or sickness and accident. Whenever out-door relief is given to an able-bodied person, half of it is to be in the form of articles of food or fuel. Relief is given only weekly, where the pauper is not required to be received into the workhouse. No relief is to be given to able-bodied persons while they are employed for wages or hire by any person ; and every able-bodied male person, if relieved out of the workhouse, shall be set to work by the guardians, and kept so employed while he continues to receive such relief. The law with regard to the relief of the poor is so far qualified, that wherever a person applies for parochial relief, if he or she has a father or grandfather, mother or grandmother, or child, who is able to maintain such pauper, then the parish officers can obtain an order from justices to compel such relative to contribute a sum towards such maintenance. So husbands or fathers of paupers are bound to contribute to such maintenance. In all cases, the pauper is relieved either in the workhouse or out of the workhouse, according to the regulations of the poor-law orders. In some cases, the guardians or overseers may employ the poor in public works ; but this is seldom done, except on occasions like the Lancashire distress. The law as to the settlement of the poor is somewhat intricate, and gives rise to much litigation. There are various grounds on which this settlement is acquired. Thus, every person has, *primâ facie*, a settlement in the parish where he was born, until some other is proved ; and there are so many other qualifications, that it is seldom a birth-settlement is resorted to. By marriage, a woman immediately acquires the settlement of her husband, if he has one, whether the husband be an Englishman or a foreigner. If the husband has no settlement, then the wife is thrown back on her maiden settlement. Formerly, a person acquired a settlement in a parish by hiring and service, and by residence for forty days under such hiring ; but since 1834, no such settlement can be acquired. If any person shall be bound an apprentice by indenture, and reside forty days under such apprenticeship, he or she acquires a settlement thereby. So whoever shall rent a tenement in a parish, and actually occupy the same, and be rated to the poor for one whole year, the rent being not less than £10, and paid by the person so actually occupying the tenement, shall acquire a settlement. So a person acquires a settlement by acquiring an estate in land, however small in value, and residing forty days in the parish. So, if a person buy an estate, and the consideration amount to £30 at least, he shall thereby acquire a settlement. Formerly, a settlement was acquired by serving a public annual office, such as that of constable,

although the rights of both were not the same. In more than one instance, these elections were attended with violence, and even with blood, and the electoral body was by degrees limited. At length, by a decree of Pope Nicholas II. in 1059, the right of election was vested in the cardinals. By the constitution of the College of Cardinals, provision was made for a representation of all the ancient electoral bodies; the cardinal bishops representing the bishops of the Roman synod, the cardinal priests representing the pariah clergy, and the cardinal deacons representing the heads of the popular electoral districts (*regiones*) of the city. This constitution is the basis of the present electoral law. Preparatory to an election, the cardinals are shut up in what is called 'the conclave,' all communication with the outer world being interrupted until the election shall have been made. A simple majority of voices does not suffice—two-thirds of the cardinals must vote for the same candidate. There are four modes of election—'scrutiny,' 'access,' 'compromise,' and 'inspiration.' Twice each day during the conclave, the cardinals assemble, and each deposits, in a chalice placed on the altar, the name of his candidate. If the requisite number of votes are not found for any one, the papers are at once burned; and the smoke of the burning votes, which escapes through a small flue, is a signal to the expectant crowd outside that no election has taken place. This is called the 'scrutiny.' If votes be added to those already given for one candidate so as to make the required two-thirds, it is called 'access.' If the cardinals of two parties, finding that neither can hope to succeed, unite, it is called 'compromise.' If by a public movement, whether sudden or preconcerted, a particular candidate named be brought forward and carried as if by acclamation, the election is said to be by 'inspiration.' The present pope, Pius IX., was elected in this way. The greater Catholic powers—France, Austria, and Spain—were formerly understood to have the privilege, through one of their cardinals, of placing a veto upon the election of one candidate; but this right was of a very vague and undefined nature, and had no formal foundation in law. It is required by long usage, as a condition of election, that the candidate be an Italian, and that he be of mature age. Other considerations are also entertained. After election, the pope is enthroned, enters upon possession of his see, and finally, is solemnly crowned. The ceremonial of consecration is very splendid and deeply impressive. One of the ceremonies—that of burning a bunch of flax before him, with the words: 'Holy Father, thus passeth away the glory of the world!'—has often been cited for its highly symbolical character, as well as for its dramatic effect. Cardinals, in order to vote, must be present at the conclave—no voting by proxy is permitted.

3. The general nature of the office of the pope in the Roman Catholic system, and of the functions which it involves, may be inferred from the character which he is believed to hold in the church, as successor of St Peter, and vicegerent of Christ on earth. He is therefore believed to be invested with all the powers necessary for the practical government of the church. Hence he is held (1) to possess over the entire church, and each of its parts, a supreme authority not indeed arbitrary, but regulated by the law of God and by the canons. He has power (2) to examine and decide authoritatively all controversies; (3) to convoke councils; (4) to revise and confirm their decrees; (5) to issue general decrees, whether upon discipline and morals, or upon doctrine; (6) he is the centre of communion, separation from which involves the forfeiture of

the communion of the whole church; (7) he has ultimate authority to appoint bishops in all parts of the church, and however this right may be exercised in the first instance, as by the sovereign, by the clergy, or by a synod of bishops, it rests with the pope to confirm the election, no matter how it may have been made, and to grant 'canonical institution'; (8) he can also deprive bishops, and set others in their place; and can even, in cases of great emergency, suppress bishoprics, and change their ecclesiastical limits according to his judgment of the existing requirements of the church; (9) he has authority to judge of the doctrines taught in particular books, or by particular individuals, and to pronounce infallibly as to its conformity with the Catholic faith, or the contrary. This privilege formed the subject of the great controversy with the Jansenists as to what are called 'Dogmatic Facts.'

4. All Catholics are agreed that the pope, as primate, possesses, by divine law and in virtue of his office, full governing authority over the entire church. Of the exercise of such power, they find traces in history from the earliest times. Roman Catholic historians trace the history of the pope's primacy in St Clement's Letters to the Church of Corinth, in the action taken by Victor in the Paschal controversy, and by Stephen and Cornelius in the controversy on re-baptising heretics; in the deposition of Marcian, Bishop of Arles, at the instance of Cyprian, by Pope Stephen; in the leading part taken by the popes in the condemnation of Donatus and of the Pelagian heresy; and perhaps more than all, in the appeals made from various parts of the church by persons excommunicated by their own bishops, and the rehearing at Rome of such causes, and the confirmation or reversal of the sentence according to the result of the trial. These several facts, however, although to Catholics they appear evidences of the papal supremacy, are explained by Protestant writers in a sense which does not suppose any permanent supremacy on the part of the Roman See, and which they hold to be reconcilable with the full independence of national churches; and it is admitted by Catholics themselves, while they contend that the instances to which they appeal imply a real exercise of primacy from the beginning, that the details of that primacy have undergone a gradual and extensive development in the progress of the church. Great difference of opinion exists between the Gallican and the Ultramontane schools as to the extent and nature of the papal authority, whether in decrees of doctrine or in the government of the church. As regards doctrinal decrees, all are agreed that the judgment of the pope, in concert with the body of bishops, is infallible; but they differ as to papal decrees on doctrine issued by the pope alone, *ex cathedra*, and addressed to the whole church. See GALLICANISM. On certain points, however, both schools agree; both are agreed, for instance, as to the duty of respectful obedience on the part of all, until the general sense of the church shall have been ascertained; and should no reclamation on the part of the church take place, the decree of the pope is, in the opinion of both schools, to be received as infallible, and the doctrine propounded therein is to be held as of faith. But the Ultramontanes go beyond the Gallicans in holding this from the very moment of the decree's being issued *ex cathedra*, and independently of any reference to the church dispersed. As to the government of the church, the Ultramontanes hold the pope to be supreme, and thus to be superior to general councils, and independent of their decrees. The Gallicans, on the contrary, hold that a general council is superior to the pope, and has power to

from Christ by virtue of the episcopal office. This difference of opinion leads to many controversies of detail as to the respective rights and powers of the pope and the bishop in the several dioceses, regarding which it is only necessary to indicate the general ground of difference of opinion.

5. The chronology of the papacy in the 1st c. is very obscure. The enumerations in the ancient writers are imperfect, and they differ as to the exact order of succession. The two most ancient catalogues, those of Irenæus and Augustine, differ in more than one particular. The chief difficulty regards Linus and Cletus. The former is believed to have been the viceregent of Peter during the interval between his first coming to Rome and his final residence there. He would therefore have been at once the contemporary of Peter and his successor (though but for a very brief period). The difficulty as to Cletus arises from the doubt whether he be the same person with Anaclethus. We subjoin a catalogue drawn up after the most careful modern authorities, and arranged according to centuries :

FIRST CENTURY.		A.D.
St Peter,		41-67
Linus,		68
Cletus, or Anaclethus,	uncertain date	
Clement I.,	uncertain date	

SECOND CENTURY		
Evaristus,	about 100	
Alexander I.,	about 109	
Sixtus I., Roman,	119	
Telesphorus, Greek,	127	
Hyginus, Athenian,	138	
Pius I., native of Aquileia,	142	
Anicetus, Syrian,	151	
Soter, Greek,	161	
Eutheras, Greek,	170	
Victor I., African,	185	
Zephyrinus,	197	

THIRD CENTURY.		
Callixtus I., Roman,	217	
Urban I., Roman,	223	
Pontianus, Roman,	230	
Antherus, Greek,	235	
Fabianus, probably Roman,	236	
Cornelius, Roman,	252	
(Novatianus, first antipope.)		
Lucius I., Roman,	253	
Stephen I., Roman,	253	
Sixtus II., Roman,	257	
Donatus, Greek,	259	
Felix I., Roman,	270	
Eutychianus, uncertain,	275	
Caius, Roman,	283	
Marcellinus, Roman,	296	

FOURTH CENTURY.		
Marcellus I., Roman,	308	
(Marcellinus having died in 304 or 305.)		
Eusebius, Greek,	310	
Melchisedes, African,	310	
Silvester I., Roman,	314	
Marcus, Roman,	336	
Julus I., Roman,	337	
Liberius, Roman,	352	
(Felix II., antipope.)		
Damasus I., Spaniard,	366	
(Ursicinus, antipope.)		
Silvius, Roman,	384	
Anastasius I., Roman,	398	

FIFTH CENTURY.		
Innocent I., native of Albano,	401	
Zozimus, Greek,	417	
Boniface I., Roman,	418	
Celestius I., Roman,	422	
Sixtus III., Roman,	432	
Leo I., Roman, called 'the Great,'	440	
Hilarius, native of Sardinia,	461	
Simplicius, native of Tiber,	467	

Hormisdas, native of Frusino,	414
John I., Tuscan,	432
Felix IV., native of Beneventum,	459
Boniface II., Roman,	462
John II., Roman,	468
Agapetus I., Roman,	486
Sylvester, native of Campania,	486
Victor, Roman,	486
Pelagius I., Roman,	488
John III., Roman,	490
Benedict I., Roman,	474
Pelagius II., Roman,	478
Gregory I., Roman, styled 'the Great,'	490

SEVENTH CENTURY.		
Sabinianus, native of Tuscany,	604	
Boniface III., Roman,	607	
Boniface IV., native of Abruzzi,	608	
Deusdedit or Deodatus I., Roman,	615	
Boniface V., Neapolitan,	619	
Honorius I., native of Capua,	625	
Severinus, Roman,	638	
John IV., native of Dalmatia,	640	
Theodorus I., Greek,	641	
Martin I., native of Tuderum,	649	
Eugenius I., Roman,	654	
Vitalianus, native of Signia,	667	
Deusdedit II., Roman,	672	
Domnus I., Roman,	678	
Agathon, Sicilian,	678	
Leo II., Sicilian,	682	
Benedict II., Roman,	684	
John V., native of Syria,	685	
Conon, native of Thracia,	686	
Sergius I., native of Palermo,	687	

EIGHTH CENTURY.		
John VI., native of Greece,	701	
John VII., native of Greece,	705	
Sisinius, native of Syria,	708	
Constantine, Syrian,	708	
Gregory II., Roman,	715	
Gregory III., Syrian,	731	
Zacharias, Greek,	741	
Stephen II.,	753	
Stephen III., Roman,	753	
Paul I., Roman,	757	
Stephen IV., Sicilian,	763	
Adrian I., Roman,	768	
Leo III., Roman,	795	

NINTH CENTURY.		
Stephen V., Roman,	816	
Paschal I., Roman,	817	
Eugenius II., Roman,	824	
Valentinus, Roman,	827	
Gregory IV., Roman,	827	
Sergius II., Roman,	843	
Leo IV., Roman,	847	
In this interval is placed the fabulous pope Joan (q. v.).		
Benedict III., Roman,	855	
Nicholas I., Roman,	848	
Adrian II., Roman,	867	
John VIII., Roman,	872	
Martin II. (called also Marinus I.),	884	
Adrian III., Roman,	884	
Stephen VI., Roman,	885	
Formosus, bishop of Porto,	891	
(Sergius and Boniface VI., antipopes.)		
Stephen VII., Roman,	896	
Romanus, Tuscan,	897	
Theodorus II., Roman,	897	
John IX., native of Tiber,	897	

TENTH CENTURY.		
Benedict IV., Roman,	900	
Leo V., native of Ardea,	903	
(Christopher, antipope.)		
Sergius III.,	904	
Anastasius III., Roman,	911	
Lando, native of Sabina,	913	
John X., Roman,	914	
Leo VI., Roman,	928	
Stephen VIII., Roman,	929	
John XI.,	931	
Leo VII., Roman,	936	
Stephen IX., Roman,	939	
Martin III. (called by some Marinus II.),	943	
Agapetus II.,	946	

POPE

John XII., Ottaviano Conti, He was the first who changed his name on his elevation. (Leo VIII., antipope.)	986	Urban VI., Bartolomeo Prignano, Neapolitan (From 1378 to 1410 occurs the great Western Schism, during which, in conflict with the line of popes inserted in the catalogue, is found a rival line residing at Avignon—Clement VII., 1378–1394; Benedict XIII., 1394–1410. The Council of Pisa, 1410, deposed both rival popes; but Benedict XIII. remained in schism till his death in 1424.)	1378
Benedict V., Roman.	984	Boniface IX., Peter Tomacelli of Naples.	1390
John XIII., Roman.	985		
Benedict VI.,	972		
Domnus II., Roman.	973		
Benedict VII. (Conti), Roman.	974		
John XIV.,	983		
(Boniface VII., Franco, antipope.)			
John XV., Roman.	985		
John XVI., Roman.	986		
Gregory V., German.	986		
Sylvester II., Gerbert, native of Auvergne.	989		
ELEVENTH CENTURY.			
John XVII. (May–October).	1003		
John XVIII., Roman.	1003		
Sergius IV., Roman.	1009		
Benedict VIII., native of Tusculum.	1013		
John XIX., Roman (in some catalogues reckoned XX.; the diversity arising from a disputed election).	1024		
Benedict IX.	1033		
(Sylvester, antipope.)			
Gregory VI., Roman.	1044		
Clement II., native of Saxony.	1047		
Damasus II. (Poppo).	1048		
Leo IX., Bishop of Toul.	1049		
Victor II., Bishop of Eichstadt.	1055		
Stephen X., Frederick, Abbot of Monte Casino.	1057		
Benedict X., by some styled antipope, abdicated.	1058		
Nicholas II., native of Burgundy.	1059		
Alexander II., native of Milan.	1061		
Gregory VII., Hildebrand, native of Tuscany.	1073		
(Guibert, antipope, assumed the name of Clement III.)			
Victor III., native of Beneventum.	1086		
Urban II., native of France.	1088		
Paschal II., native of Tuscany.	1099		
(Albert and Theodoric, antipopes.)			
TWELFTH CENTURY.			
Gelasius II., native of Caieta.	1118		
Callixtus II., native of Burgundy.	1119		
Honorius II., Cardinal Lambert, Bishop of Ostia.	1124		
Innocent II., Roman.	1130		
(Anacletus, antipope.)			
Celestinus II., Tuscan.	1143		
Lucius II., native of Bologna.	1144		
Eugenius III., native of Pisa.	1145		
Anastasius IV., Roman.	1153		
Adrian IV., Nicholas Breakspeare, Englishman.	1154		
Alexander III., Cardinal Orlando Bandinelli, native of Siena.	1159		
(Victor, Paschal, and Callixtus, antipopes.)			
Lucius III., Cardinal Ubaldo of Lucca.	1181		
Urban III., Uberto Crivelli, Archbishop of Milan.	1185		
Gregory VIII., native of Beneventum.	1187		
Clement III., Paul, Bishop of Præneste.	1188		
Celestinus III., Cardinal Hyacinthus, Roman.	1191		
Innocent III., Cardinal Lotharius, native of Signa.	1198		
THIRTEENTH CENTURY.			
Honorius III., Cardinal Savelli, native of Rome.	1216		
Gregory IX., Cardinal Hugo, native of Anagni.	1227		
Celestinus IV., native of Milan.	1241		
Innocent IV., Cardinal Sinibaldo Fieschi, native of Genoa.	1242		
Alexander IV., Cardinal Rinaldo Conti, native of Anagni.	1254		
Urban IV., James, Patriarch of Jerusalem, Frenchman.	1261		
Clement IV., Guy, native of St Gilles, in Languedoc.	1265		
Gregory X., Tebaldo Visconti, native of Piacenza.	1272		
Innocent V., Cardinal Peter, native of Tarantaise.	1276		
Adrian V., Ottobono Fieschi, native of Genoa.	1276		
John XXI., native of Lisbon.	1276		
Nicholas III., Cardinal Orsini, native of Rome.	1277		
Martin IV., Cardinal Simon de Brie, Frenchman.	1281		
Honorius IV., Cardinal James Savelli, native of Rome.	1285		
Nicholas IV., Cardinal Jerome, native of Acoli.	1288		
Celestinus V., Pietro da Morrone of Abruzzi.	1294		
Boniface VIII., Cardinal Benedetto Gactani, native of Anagni.	1295		
FOURTEENTH CENTURY.			
Benedict XI., Cardinal Nicholas, native of Treviso.	1303		
Clement V., Bertrand of Bordeaux, removed the papal see to Avignon.	1305		
John XXII., James, native of Cahors, in France.	1316		
(Nicholas, antipope.)			
Benedict XII., James Fournier, Frenchman.	1334		
Clement VI., Peter Roger, native of Limoges, in France.	1342		
Innocent VI., Stephen Aubert, native of Limoges.	1352		
Urban V., William Grimoard, Frenchman.	1362		
Gregory XI., Peter Roger, Frenchman, restored the papal see to Rome.	1370		
FIFTEENTH CENTURY.			
Innocent VII., Cosmo Migliorati, native of Sulmona.	1404		
Gregory XII., Angelo Corradi, native of Venice.	1406		
Alexander V., Peter Philargius, native of Candia.	1409		
John XXIII., Cardinal Coscia, deposed by the Council of Constance.	1410		
Martin V., Otto Colonna, Roman.	1417		
Eugenius IV., Gabriel Condulmer, Venetian.	1431		
(Felix, antipope.)			
Nicholas V., Cardinal Thomas, native of Sarzana.	1447		
Callixtus III., Alfonso Borgia, Spaniard.	1455		
Pius II., Eneas Sylvius Piccolomini, native of Siena.	1458		
Paul II., Peter Barbo, native of Venice.	1464		
Sixtus IV., Francis della Rovere, Genoaese.	1471		
Innocent VIII., Gian Battista Cibo, Genoaese.	1485		
Alexander VI., Rodrigo Lenzi Borgia, Spaniard.	1492		
SIXTEENTH CENTURY.			
Pius III., Francis Todeschini Piccolomini.	1503		
Julius II., Julian della Rovere, Genoaese.	1503		
Leo X., Giovanni de' Medici, son of Lorenzo the Magnificent.	1513		
Adrian VI., native of Utrecht.	1522		
Clement VII., Giulio de' Medici, nephew of Lorenzo.	1523		
Paul III., Alessandro Farnese, native of Rome.	1534		
Julius III., Giovan Maria Giocci, native of Rome.	1530		
Murcellus II., Cardinal Cervini, native of Montepulciano.	1555		
Paul IV., Gianpietro Carafa, Neapolitan.	1555		
Pius IV., Giovanni Angelo Medici, native of Milan.	1559		
Pius V., Michele Ghislieri, native of Alessandria.	1566		
Gregory XIII., Hugo Buoncompagni, native of Bologna.	1572		
Sixtus V., Felice Peretti of Montalto, native of the March of Ancona.	1585		
Urban VII., Gian Battista Castagna, Genoaese.	1590		
Gregory XIV., Nicola Sfondatti, native of Milan.	1590		
Innocent IX., Gian Antonio Facchinetti, native of Bologna.	1591		
Clement VIII., Ippolito Aldobrandini, native of Fano.	1592		
SEVENTEENTH CENTURY.			
Leo XI., Alessandro de' Medici, native of Florence.	1605		
Paul V., Camillo Borghese, native of Rome.	1605		
Gregory XV., Alessandro Ludovici, native of Bologna.	1621		
Urban VIII., Maffeo Barberini, Florentine.	1623		
Innocent X., Gian Battista Pamili, native of Rome.	1644		
Alexander VII., Fabio Chigi, native of Siena.	1655		
Clement IX., Giulio Rospigliosi, native of Pistola.	1667		
Clement X., Emilio Altieri, native of Rome.	1670		
Innocent XI., Benedetto Odescalchi, native of Como.	1676		
Alexander VIII., Pietro Ottoboni, native of Venice.	1689		
Innocent XII., Antonio Pignatelli, native of Naples.	1691		
EIGHTEENTH CENTURY.			
Clement XI., Gian Francesco Albani, native of Urbino.	1700		
Innocent XIII., Michael Angelo Conti, native of Rome.	1721		
Benedict XIII., Vincenzo Maria Orsini, native of Rome.	1724		
Clement XII., Lorenzo Corsini, native of Florence.	1730		
Benedict XIV., Prospero Lambertini, native of Bologna.	1740		
Clement XIII., Carlo Rezzonico, native of Venice.	1758		
Clement XIV., Gian Vincenzo Ganganelli, born near Rimini.	1769		
Pius VI., Angelo Braschi, native of Cesena.	1775		
NINETEENTH CENTURY.			
Pius VII., Gregorio Barnaba Chiaramonti, native of Cesena.	1800		
Leo XII., Annibale de la Genga, native of Romagna.	1823		
Pius VIII., Cardinal Castiglioni, native of Cingoli.	1829		
Gregory XVI., Mauro Cappellari, native of Belluno.	1831		
Pius IX., Giovanni Maria Mastai-Peretti, native of Sinigaglia.	1846		

Protestants generally object to the list of popes given by Roman Catholics, that there is no absolutely conclusive evidence of the apostle Peter's ever having been at Rome; although most of them admit the probability that he was there, and suffered martyrdom there. But they deny that there is any evidence whatever of his having exercised the office of bishop either there or anywhere else. They call in question many other of the names and dates in the earlier part of the list, not so much disputing the existence of the persons named, as their exercise of the office of bishop in

POPLAR—POPLIN.

among British trees, but probably not indigenous in Britain, is a tree of 80 feet or upwards; with a fine spreading head; and roundish, heart-shaped, lobed, and toothed leaves, which are smooth, shining, and dark-green above, downy and silvery-white beneath. The wood is used by cabinet-makers, turners, and toy-makers. It is little liable to swell or shrink, which adapts it for various purposes. The tree loves low situations and clay soils. This tree has of late years suffered in Britain from some unknown cause, like the potato, dying where it previously flourished; whilst other poplars, the most nearly allied, continue to flourish in the same localities.—The GRAY P. (*P. canescens*) is very similar to the White P., but of more vigorous growth, a large spreading tree; the leaves similar to those of the White P., but not so dark-green above or so white beneath. It is not of so rapid growth as the White P.; and its wood is harder and better, makes good flooring, and is preferable to pine-deal for the neighbourhood of fireplaces, being less apt to take fire; it is also used for coarse doors, carts, barrows, &c., and not being liable to warp, is esteemed by wood-carvers. The tree generally begins to rot in the heart when forty or fifty years old. Like most of the other poplars, it fills the ground around it with suckers. Like the White P., it is a very doubtful native of Britain, and belongs to the centre and south of Europe.—The BLACK P. (*P. nigra*), a native of most parts of Europe, and perhaps of England, is a tree of 50–80 feet high, with an ample spreading head, viscous leafbuds, and deltoid or unequally quadrangular, perfectly smooth leaves. The wood is used for the same purposes as

ornamental purposes to every other tree. It is common in the streets and squares of towns in all parts of Britain; and is particularly adapted to

Lombardy Poplar (*P. fastigiata*).

situations where a long horizontal line of any kind fatigues the eye, or as seen starting up from a mass of lower wood or shrubbery, but has a besom-like appearance when planted in unsuitable situations. The wood is of almost no value. It is generally propagated by layers.—The species commonly known as BLACK ITALIAN P. (*P. monilifera* or *adadesea*), although it is really a native not of Italy, but of North America, and is sometimes more correctly called CANADIAN P., the female catkins of which resemble a string of pearls, is frequently planted both as an ornamental tree and for the sake of its timber, which is useful for flooring, &c. The leaves are deltoid. It is of very rapid growth, and attains a height of 100–120 feet.—The BALSAM P., or TACAMAHAC (*P. balsamifera*), a very common ornamental tree in Britain, is a native both of North America and of Siberia, and has whitish ovate-oblong leaves, which in spring are of a delicate yellow tint, and have an agreeable fragrance. The leaf-buds are viscid. The erect fastigate manner of growth approaches that of the Lombardy Poplar. The resinous exudation of the buds (*Tacamahac*) is said to be diuretic and antispasmodic; and an ointment made from the buds is used for tumours, wounds, and burns. The resinous exudation of the buds of other species, as the Black P., possesses similar properties.—The COTTON-WOOD (*P. Canadensis*) of North America, particularly abundant on the upper parts of the Mississippi and Missouri, is valued as a timber tree, and has been pretty extensively planted in Britain; as has also the ONTARIO P. (*P. canadensis*), a species with the same balsamic character as *P. balsamifera*, and chiefly distinguished from it by its larger leaves. In size of leaf, no other species equals *P. heterophylla*, a native of the Southern States of North America, the leaves of which are often six inches long.

POPLIN (Fr. *popeline*). In the 15th c., a fabric was woven in Avignon called *popeline*, which was made of silk, and was much esteemed. An attempt to imitate it was introduced into England, and the name was corrupted to *poplin*, which has been adopted abroad as well as at home. In 1775, the manufacture was introduced to Ireland by French

Black Poplar (*P. nigra*).

that of the White and Gray Poplars. The 'cotton' from the seeds has been used in France and Germany for making cloth hats and paper, but these uses of it were not found profitable.—The LOMBARDY P. (*P. fastigiata* or *dilatata*) is perhaps a mere variety of the Black P., with erect instead of spreading branches. It appears to have been introduced into Europe from the East. It is very common in the Punjab and in Persia, and now also in Lombardy and other parts of Italy. It attains a height of 100, or even 160 feet, and is remarkable for its erect form, contracted head, and very rapid growth. It is often planted as an ornamental tree, although not so generally as in the end of last century, when it was thought preferable for

PORBEAGLE—PORIFERA.

PORBEAGLE (*Lamna Cornubica*, or *Iurus Cornubicus*), a fish of the Shark family (*Squalidae*), not uncommon on the British coasts. It has two dorsal fins, the first about the middle of the back, the second near the tail. The tail-fin is large and forked. The head is pointed. The gill-openings are large. The teeth are flat, triangular, smooth, sharp, and cutting. The P. is also called the **BEAUMARIS SHARK**. It attains a length of about six feet. Small companies associate in pursuit of prey, which consists of fish of various kinds. No creature is more voracious; three large hakes have been found in the stomach of a porbeagle.

PORCELAIN. See **POTTERY** and **PORCELAIN**.

PORCH, a building forming an enclosure or protection for a doorway. Every one knows how much this beautiful feature is now used, and how efficient it is as a protection from the wind and weather. In Elizabethan and mediæval architecture, the porch was also very common in domestic architecture. In churches, it was almost universal in this country. In France, many splendid porches or portals remain; they are amongst the most beautiful specimens of mediæval art. In England, wooden

Porch of Aldham, Essex (1350).
(From Parker's *Glossary of Architecture*.)

porches, of picturesque structure, are very common in the parish churches of the middle ages.

PORCUPINE (*Hystrix*), a genus of mammalia, of the order *Rodentia*, and family *Hystriidae*. This family is remarkably characterised by an armature of spines, which, like those of the hedgehogs, are, as to their structure, merely thick and strong hairs. The *Hystriidae* are plantigrade; the fore-feet have four toes and a rudimentary thumb, the hind-feet have five toes. Their general aspect is heavy and pig-like, and they have a grunting voice. The muzzle is broad and blunt; the ears short and rounded; the incisors smooth and large, two above, and two below; the molars eight above, and eight below. The name porcupine is derived from the French words *porc*, a hog, and *epin*, a spine.—The Common P. (*H. cristata*) is a native of the south of Europe, of many parts of Asia, and of most parts of Africa. It is one of the largest of rodents, being from two to three feet in length, besides the tail, which is about six inches long. The hinder part of the head and the neck are furnished with a crest of long bristles, capable of being elevated or depressed at pleasure. The muzzle and limbs are covered with very short hair; the back and sides with

spines, which are longest on the middle of the back,

Porcupine (*Hystrix cristata*).

where they are almost of the thickness of a goose-quill, and more than a foot long. The spines are supported by a slender pedicle, and they terminate in a sharp point; they are longitudinally striated, and are ringed with black and white, which gives a general gray colour to the animal. Their ordinary position is flat, with the points directed backwards; but when the animal is excited, they are erected, and it rolls itself up like the hedgehog, with spines pointing in every direction. The tail spines or quills are of very singular structure, being open thin-sided tubes, about two inches long, supported upon slender flexible pedicles; and they make a sound by rattling together when the tail is shaken. The P. is said to rattle also the spines of its body when irritated, but this is doubtful. The statement has been often made, that it throws off its spines or quills by a voluntary act, launching them at its adversaries; but it has no such power, although it is possible that quills ready to come off may be detached in moments of excitement, and fly to a small distance with sufficient force to be annoying to a pursuer. The P.'s armour, however, is strictly defensive, and it seeks to turn its back, and thus the points of its spines to an enemy. It is a solitary and nocturnal animal. It burrows in the ground, and in winter it becomes torpid. It feeds on roots, bark, fruits, and other vegetable substances, sometimes committing great depredations in gardens. The spines or quills of the P. are used for various purposes, and have a certain commercial value. It is chiefly sought on account of them; although its flesh is eaten, and was brought to the market of ancient Rome.—A larger species of P. (*H. leucurus*), with the quills of the tail quite white, is found in India, and other species inhabit different parts of the East. The **ATHERURE**, or **TUFTED-TAILED P.** (*Atherura fasciculata*), a native of India and Malacca, differs from the true porcupines in the head and muzzle not being convex, in having the quills flattened like blades of grass, and those of the tail gathered into a tuft at the end of it. The Canada P., or *Urson* (q. v.), is still more different from the true porcupines; and the *Coendus* (*Synderes*) of the warm parts of America—which are covered with short quills, and, like the *urson*, live among the branches of trees—are remarkably distinguished by their long prehensile tail.

PORIFERA (Lat. *poro-bearing*) is the term employed by Dr Grant to designate the class *Spongia*, or *Sponges*, in consequence of the appearance which the members of this class present when a section is made through their tissue. The term *Spongia* is used in preference by many naturalists.

rock, but is applied to any rock which, like the Rosso antico, has a homogeneous earthy or compact base, through which are scattered distinct crystals of one or more minerals of contemporary origin with the base. Thus, gray volcanic trachyte often abounds in crystals of glassy felspar, forming a trachytic porphyry; or crystals of felspar, quartz, or calcareous spar, disseminated through a base of greenstone, form a greenstone porphyry. In the same way, there are pitchstone porphyry, basaltic porphyry, claystone porphyry, &c.

PORPOISE, or **PORPESSE** (*Phocæna*), a genus of Cetacea, of the family *Delphinidae*, having a form similar to the dolphins, but the muzzle short, uniformly convex, and without a beak; a dorsal fin; the teeth very numerous, simple, and equal. The Common P. (*P. communis*) is the most plentiful of the Cetacea on the British coasts, abounding particularly on the western coasts of Ireland and of Scotland. It is found also on all the coasts of Europe from the Mediterranean northwards, on the

Porpoise (*Phocæna communis*).

coasts of North America, and in the arctic regions. It is one of the smallest of the Cetacea, its length sometimes not exceeding four feet, although individuals occur of six or even eight feet in length. The body is spindle-shaped; its greatest diameter is near the dorsal fin. The skin is perfectly smooth, and destitute of hair. There are from 40 to 50 teeth in each jaw, not conical, as in most of the Cetacea, but compressed. The eye is rather small, and the pupil in the form of a V. The opening of the ear is very minute, like a hole made with a pin. The blow-hole is crescent-shaped, with the horns of the crescent directed forwards, and is situated exactly over the eyes.

The P. is gregarious, and large numbers are often seen together, sometimes swimming in file, when their backs, appearing above the surface of the water, are apt to suggest the idea of a great sea-serpent; sometimes gambolling, either in fine weather, or when a storm is approaching, or even in the midst of a storm. The P. feeds on fish, which its teeth are admirably adapted to catch, and herds of porpoises pursue the vast shoals of herring, mackerel, &c., into bays and estuaries. The P. sometimes ascends rivers, apparently in pursuit of salmon, as far as the water is brackish, and is not unfrequently itself caught on such occasions. It is an object of pursuit on account of its skin, its oil, and its flesh. The skin is nearly an inch thick, but is planed down until it becomes translucent, and is made into excellent leather, which is used for covering carriages and for other purposes. Little use is made of it in Britain, but it is used in America. Under the skin is a layer of fat, about an inch in depth, which yields oil of the finest quality. The flesh is dark-coloured and bloody, but was in former times highly esteemed, and

reckoned fit for the table of royalty, perhaps partly because among Roman Catholics it was accounted fish. In the time of Queen Elizabeth, it was still used by the nobles of England, and was served up with bread-crumbs and vinegar. It is now used only in very northern regions. It is a chief dainty of the Greenlanders.—The Grampus (q. v.) is commonly referred to this genus.—Another species of P. (*P. Capensis*) is found near the Cape of Good Hope.—The name P. is from the French *porc-poisson*, or the Italian *porco-pece* (Hog-fish), corresponding to the French *marsoin* (Sea-hog) and the German *meerschwein*.

PORRIGO. See FAVUS and RINGWORM.

PORSENNA, also **PO'RSENA**, LARS or LARTE (Lar, in Etruscan means 'lord' or 'prince'), in the early and uncertain history of Rome, appears as a powerful king of Clusnum in Etruria. According to the legend told by Livy for history, when Tarquin the Proud was expelled from Rome, he sought the help, first of the Veii and the Tarquini (his Etruscan kinsmen), against his revolted subjects; but their efforts not proving successful, he turned to P., who willingly espoused his cause, and marched a great army against Rome. The Etruscan king seized the Janiculum, a fortified hill on the west side of the Tiber; and would have forced his way into the city across the 'Bridge of Wooden Piles' (*Pons Sublicius*), had not a brave Roman, Horatius Cocles, kept the whole of P.'s army at bay, while his comrades behind him hewed down the bridge; after which he plunged into the Tiber, and safely swam across its waves. P., we are informed, now laid siege to Rome; and after a while, the inhabitants began to suffer so severely from famine, that a desperate expedient was had recourse to. Three hundred of the noblest Roman youths swore to peril their lives in cutting off the Etruscan king. The first on whom the lot fell was O. Mucius, who stole into the camp of P., but not knowing the person of the king, killed his secretary instead. He was instantly seized, and put to the torture; but the unshrinking audacity with which he thrust his right hand into the fire and let it burn, moved the king so much, that he pardoned him; whereupon Mucius (ever afterwards called *Scorpius*, 'the Left-handed') told him of the jeopardy in which he was placed. P. resolved to make peace with Rome at once, and his conditions, which were pretty favourable, being accepted by the sorely-pressed citizens, he withdrew his forces. This version of the story is wholly discredited by modern criticism, and is believed to have been invented by the patriotic annalists of ancient Rome to conceal the fact of a temporary Etruscan conquest, and the evidence in favour of this view is overwhelming. Tacitus even expressly affirms that P. conquered the city; Dionysius informs us that the senate sent him an ivory sceptre, a golden crown, and a triumphal robe, which was the form that had been adopted by the Etruscan cities themselves of acknowledging the supremacy of the Roman king, Tarquinius Priscus; and Pliny mentions a circumstance which is quite conclusive as a proof of the subjugation of Rome—viz., that P. forbade the citizens to use iron, except for agricultural purposes. Niebuhr, who has placed this view beyond all doubt, notices various minor incidents which are perfectly unintelligible, except on the hypothesis of an Etruscan conquest. The whole details of the ancient legend, therefore, may be regarded as fabulous—the product of patriotic unveracity—and what seems most reasonable to believe, is, that a great rising of the Etruscan against the Latin races took place, and that Rome, forming the Latin frontier towards

PORT D'URBAN—PORT ROYAL-DES-CHAMPS.

mahogany, logwood, honey, coffee, cocoa, and rags. Pop. about 30,000. The town has suffered frequently from earthquakes.

PORT D'URBAN, or **PORT NATAL**, the only seaport of the colony of NATAL (q. v.).

PORT ELIZABETH, an important seaport of South Africa, commercial capital of the Eastern Province of the British colony of the Cape of Good Hope, stands on the western shore of Algoa Bay (q. v.), in lat. about 34° S., long. 25° 35' E. Many of the streets are elegant. One range of houses, consisting of four streets, which will bear comparison with the best streets in England, forms a continuous line two miles in length. In the style of its buildings, this town is superior to any other in South Africa. Its magnificent warehouses are constructed on a palatial scale, and resemble the finest in London, and its public buildings are all solid and substantial edifices. The principal are the town-house, 90 feet square and three stories high, containing the public library, the athenæum, and the municipal chambers; the public hospital, furnished with 100 beds; the Presbyterian and other churches, and the Roman Catholic cathedral. Its educational institutions are of a superior description. In 1854, under the auspices of Governor Sir George Grey, a system of schools was introduced known as the Grey Institute Schools, founded on a magnificent grant of town-lands, yielding at present (1864) a revenue of over £1000 per annum, and affording a very excellent education at a very moderate charge. The chief of these are a high-school or college, and three elementary or district training-schools.

The town was founded in 1820, and its pop. (1864) was 17,968. Its progress has been, and continues to be very rapid, and it is said to double itself in population, wealth, and extent every ten years. Its fixed or real property, as assessed in 1863 for municipal purposes, amounts in value to £1,268,765. It owes its commercial importance in great part to the circumstance of its being the emporium of the great wool trade of the colony; and besides this it carries on a rapidly-increasing home and foreign trade. The value of its home business may be estimated from the extensive transactions of its banks, which are three in number, and whose half-yearly statements for June 1864 shewed assets to the extent of over £1,500,000. Its foreign trade is with Europe, America, Brazil, Australia, Mauritius, China, and India, and the value of its exports and imports amounts to nearly £4,000,000.

The shore is open to the swell of the Indian Ocean, which often rolls in upon the beach with such violence that, until recently, cargoes could only be got to land by the use of surf-boats. Kaffirs, tempted by the high pay offered, used to come from a great distance to do the difficult and dangerous work of unloading the boats (which they did standing breast-high in the water), and carrying the bales to the shore. But this system of landing is now in great measure done away with, and ships now unload at jetties, several of which run out into the bay.

PORT-GLASGOW, a parliamentary burgh and seaport of the county of Renfrew, Scotland, is situated on the Clyde, about 2 miles east of Greenock and 20 miles north-west of Glasgow. It was founded in 1668 by the magistrates of Glasgow as a harbour for the ships that belonged to or traded with their city—the Clyde at Glasgow being then inconveniently shallow, and the idea of deepening the river not having yet occurred. In 1695, the town and a small adjacent district were made into an independent parish; in 1710, it was

constituted the principal custom-house on the Clyde, and for a while took the lead of Greenock; in 1775, it was incorporated as a municipality, and by the Reform Bill of 1832, it was raised to the rank of a parliamentary burgh, uniting with Kilmarnock, Rutherglen, Dumbarton, and Renfrew in electing a member of the legislature. P.-G. is rather a well-built town; the streets are in general regularly laid out, crossing each other at right angles, and the houses are of a substantial order. The principal buildings are the town-house, custom-house, and churches of the different denominations. P.-G. has extensive manufactures of sail-ropes, chain-cables, several sugar-refineries, foundries, building-yards, commodious quays and wet-docks. The deepening of the Clyde, by means of which large vessels can now ascend to Glasgow, seriously injured its commercial prosperity, but it is still the principal port on the Clyde for the importation of North American timber. Pop. (1861) 7214.

PORT LOUIS, the capital and principal port of the British colony of Mauritius, is situated on an inlet on the north-west coast. Its streets, though narrow, are straight, and are furnished with foot-paths, and macadamised. It contains a number of public buildings, among which are a theatre, library, hospital, and botanic garden. Its harbour is capacious, but is quite safe only during the fine season. The imports and exports of the colony are mainly transacted at P. L.; and their quantity, value, and character are mentioned under the article Mauritius (q. v.). Pop. of the port variously given at 26,000 and 35,000.

PORT MAHO'N (anc. *Portus Magonis*), the capital of the island of Minorca (q. v.), is beautifully situated on a deep and narrow inlet in the south-east of the island. Its harbour, sufficiently spacious to accommodate a large fleet of men-of-war, is one of the finest in the Mediterranean, and is protected by three forts. It has no architectural features worthy of special notice, but is on the whole well built. The military governor and the bishop of the island reside here. In 1860, 78 vessels of 15,162 tons entered and cleared the port. Pop. 12,600.

PORT PATRICK, a burgh of barony and fishing village of Scotland, in the county of Wigtown, and 6½ miles south-west of Stranraer. It is surrounded by hills on the land side, and its harbour is protected by two piers, but remains incomplete. It is the nearest point of Scotland to the Irish coast, being only 21½ miles north-east of Donaghadee. Pop. (1861) 1206.

PORT PHILLIP. See MELBOURNE.

PORT ROYAL-DES-CHAMPS, a convent of Cistercian nuns, near Versailles, which obtained much celebrity during the 17th century. It was founded for nuns by a member of the family of Montmorenci, in the early part of the 13th c.; and soon after its establishment, obtained from the pope the privilege of receiving lay persons, who, without taking monastic vows, desired to live in religious retirement. This portion of the P. R. institute in later times became of great importance. The discipline of the convent having been much relaxed in the 15th and 16th centuries, one of its worst abuses—that of appointing the superior, not on account of fitness, but from considerations of family or other worldly or political motives—became in the end the occasion of its complete reformation. Angélique Arnauld, sister of the celebrated brothers Arnauld, was appointed, when a mere child, coadjutrix of the abbess, and on the death of this lady, although she was then only in her eleventh year, herself succeeded to the office. As Mère Angélique advanced in years, she felt moved, although still

PORTLAND VASE. A beautiful cinerary urn, of transparent dark-blue glass, found about the middle of the 16th c. in a marble sarcophagus near Rome (see the article GLASS, where it is figured and described). It was at first deposited in the Barberini Palace at Rome (and hence often called the Barberini Vase); it then became (1770) the property, by purchase, of Sir William Hamilton (q. v.), from whose possession it passed into that of the Duchess of Portland. In 1810 the Duke of Portland, one of the trustees of the British Museum, allowed it to be placed in that institution, retaining his right over it as his own property. In 1845 a miscreant named William Lloyd, apparently from an insane love of mischief or a diseased ambition for notoriety, dashed this valuable relic to pieces with a stone. Owing to the defective state of the law, only a slight punishment could be inflicted; but an act was immediately passed, making such an offence punishable with imprisonment for two years, and one, two, or three public or private whippings. The pieces of the fractured vase were carefully gathered up, and afterwards united in a very complete manner; and thus repaired, it still exists in the Museum, but is not shewn to the public. A small number of copies of the Portland Vase were made many years ago by Mr Wedgewood, and were sold at 25 guineas each.

PORTLAW', a small manufacturing town of the county of Waterford, Munster, Ireland, about 10 miles west-north-west of Waterford. P. has risen within the last 30 years from a small village into a town of great activity and of extensive manufactures, through the enterprise of a single family named Malcomson, by whom the cotton manufacture has been introduced with great success. The population in 1861 was 3915, of whom 3684 were Catholics, 149 Protestants of the Established Church, and the few remaining, members of the Methodist society. P. is admirably provided with schools and other institutions for the social and moral improvement of the population.

PORTO ALEGRE, a town of Brazil, capital of the province of São Pedro do Rio Grande, stands at the north-west extremity of the Lake of Patos, by means of which it communicates with the sea. It was founded in 1743, is well built, and contains 12,000 inhabitants. It is provided with wharfs; and its trade, though not altogether inconsiderable, has been much retarded by the frequently disturbed state of the country.

PORTOBELLO, a parliamentary borough and watering-place, occupies a plain on the south bank of the Firth of Forth, in the county of Edinburgh, and three miles east of the city of that name by the North British Railway. A commodious new town-hall was built here and opened in 1863. This town is a favourite resort for sea-bathing and summer quarters during the season. Besides the facilities for bathing offered by the fine sands of the shore, there is a commodious suite of baths of different kinds. A marine promenade, a mile in length, runs along the shore. P. is also a manufacturing town, and its manufacturing establishments comprise potteries, and earthenware, bottle, brick, and paper works, &c. Pop. (1861) 4366; and, in summer, between 7000 and 8000. The town derives its name from the first house built here about the time of the seizure of the town of Puerto Bello, in the Isthmus of Panama, and which was called Portobello.

PORTO BELLO. See **PUERTO BELLO**.

PORTO FERRAJIO. See **ELBA**.

PORTO NOVO, a town in the Madras Presidency of India, situated on the Coromandal coast, in lat.

11° 31' N., and long. 79° 51' E. Both the Danes and the Dutch had formerly a factory here. The place is celebrated for the battle fought here on 1st July 1781, when Sir Eyre Coote defeated Hyder Ali. The British force consisted of only 7878 men, including artillery; Hyder's army numbered over 60,000. Coote was retiring before Hyder. After leaving P. N., he had only advanced a few miles along the seashore, when he found his path intercepted by the enemy's batteries, the sea confining him on the right, and a range of sand-hills on the left. The British army made two assaults; in one, they carried the batteries; in the other, they took advantage of an opening in the sand-hills, which Hyder had neglected to guard, and came suddenly upon the enemy's flank. A schooner of war meantime standing in close, poured her broadsides of small guns into the enemy. Their rout was complete. P. N. is celebrated for its iron foundry, which of late years has supplied much of the material for the Madras railways. The population of P. N. is about 12,000.

PORTO RICO. See **PUERTO RICO**.

PORTREE. See **SKYE**.

PORTREEVE (from *port* and *reeve*, Saxo *gerefa*, a word of similar origin to the German *graf*, signifying a governor or chief magistrate), the principal magistrate in a maritime town. This was the early name of the officer afterwards called mayor in London and elsewhere.

PORTSEA ISLAND, a small island on the south coast of Hampshire, has on its west side Portsmouth Harbour, on its south-east side Langston Harbour, on its east side Chichester Harbour, and is separated from the mainland on the north by a narrow channel, crossed by several bridges. It is four miles long, by from two to three miles broad, and contains the important towns of Portsea and Portsmouth (q. v.).

PORTSMOUTH, the chief naval arsenal of Great Britain, and an important seaport, market-town, and municipal and parliamentary borough, in the south of Hampshire, stands on the south-west shore of Portsea Island (q. v.), at the entrance to Portsmouth Harbour, and opposite the town of Gosport, with which it communicates by means of a steam-bridge. It is 74 miles south-west of London by the London and South-western Railway. Besides the parish of P., the limits of the municipal and parliamentary borough, which are co-extensive, include also the parish and town of Portsea, and the out-wards Landport and Southsea. The population of the borough, with its suburbs, was (1861) 94,799. P. is for the most part a mean-looking, dirty town, though, as a fortress, it is considered the most perfect in Britain. Formidable batteries defend the harbour; and bastioned ramparts, faced with masonry, planted with trees, and surrounded by trenches and outworks, enclose the town. Portsea, about a mile to the north, is similarly fortified, the line of its land-defences being distinct from that of Portsmouth. Southsea, which is situated outside the walls skirting Southsea Common, is rapidly increasing and is now a fashionable watering-place. In the town proper, there are few objects of note. Pleasing views may be had from the ramparts and batteries, as the harbour, the roadstead of Spithead, and the Isle of Wight, on the coast of which the white walls of the royal residence of Osborne House are seen gleaming among the trees. Among the few notable buildings may be mentioned the church of St Thomas, the chancel and transepts of which date from the 12th c., and which contains a ghastly cenotaph in memory of the murdered Duke of Buckingham (see *infra*). In front of the Garrison

Chapel is buried the brave Sir Charles James Napier (q.v.), who died in this neighbourhood in 1853. The dockyard of P., in the district of Portsea, is at present 116 acres in extent, the largest in the country. Works are, however, now (January 1863) in progress which will increase the area to a total of 293 acres. Of this immense naval establishment, the most noteworthy, if not the most recent, features are the mast and rope houses, hemp-stores, rigging-stores, sail-loft, and the dry docks, six in number, spacious enough to admit the largest vessel, and offering every facility for their speedy repair. The docks are generally 22 feet deep, lined with solid masonry, and roofed over and closed by lock-gates. Of the various building-ships, one of them, roofed and covered in, is so large that three or four vessels can be in process of construction under it at the same time. The Wood Mills contain a number of most ingenious block-making machines, the invention of Sir Isambard Brunel, in which rough timber, introduced at one end, is cut, squared, drilled, bored, and turned into the required shape. About 140,000 blocks are made here annually, and the machines require the attendance of no more than four men. In the smithy, anchors are forged by aid of a Nasmyth's hammer. The dockyard also contains the residences of the superintending officers, and a school of naval architecture.

Portsmouth Harbour, about 420 yards wide at its entrance, expands into a spacious basin, extending inland for about 4 miles, and having a breadth of 3 miles along its northern shore. Large war-vessels can enter and lie at anchor at all times of the tide. The outward entrance is defended by Monkton Fort and Southsea Castle. The position of this harbour is highly favourable. It is situated in the middle of the channel, close to the magnificent anchorage of Spithead, where 1000 ships of the line may ride without inconvenience, and is under shelter of the Isle of Wight, and opposite the French arsenal of Cherbourg.

The local trade of P. is supported by the dockyard and the other public establishments of the town. Brewing is largely carried on in the town and vicinity. Coals, cattle, sheep, corn, and provisions are imported from our own coasts, and timber and wine from abroad. In 1863, 2495 vessels, of 188,216 tons, entered and cleared the port.

The importance of this port dates only from the reign of Henry VIII. Its defences were strengthened by Elizabeth, and afterwards in a more thorough manner by William III. Here, in a house that still remains in the High Street, and which was then an inn called the 'Spotted Dog,' the Duke of Buckingham (the 'Steenie' of King James) was assassinated by John Felton. On the 29th of May, 1792, Admiral Sir John Jervis, the Royal Admiral, nearly 1000

ly seaport of bank of the he Atlantic, ton, a well-neum, state, 2 market-ries of cotton There is a navy-yard, and two forts, 1623. Pop.

of Virginia, ver, opposite

Norfolk, and 8 miles from Hampton Roads. It has a court-house, scientific and military academy, 5 newspapers, 6 churches, tobacco-factories, &c., and connections with the southern railways. Its proximity to Fortress Monroe caused it to be held, during the War of Secession, by the Federal forces. Pop. in 1860, 9487.

PORTSMOUTH, a village of Ohio, U.S., on the north bank of the Ohio River, at the mouth of the Scioto, the terminus of the Scioto and Hocking Valley Railway, and Ohio and Erie Canal, 115 miles east-by-south from Cincinnati, and 90 south of Columbus. It has 14 churches, 2 iron foundries, 3 machine-shops, 2 distilleries, 6 banks, and 5 newspapers. Pop. in 1860, 6268.

PORTUGAL, the most westerly kingdom of Europe, a part of the great Spanish peninsula, lies in 36° 55' - 42° 8' N. lat., and 6° 15' - 9° 30' W. long. Its greatest length from north to south is 368 miles, and its average breadth from east to west about 100 miles. The kingdom of P. Proper is bounded by the Atlantic on the S. and W., and by Spain on the N. and E. Its distinctive subdivisions, with their several areas and populations, are given in the following table:

CONTINENTAL PORTUGAL.

Provinces.	Districts.	Area in Sq. Miles.	Pop. 1861.
MINHO,	Viana,	3094.56	887,859
	Braga, Porto,		
TRAS OS MONTES,	Bragança, Vila Real,	3980.76	240,186
BEIRA,	Aveiro,	6575.77	1,210,056
	Cóimbra,		
	Viseu,		
	Guarda, Castelo-Branco,		
ESTREMADURA,	Lisbon,	6180.97	785,866
	Lisbon, Santarém,		
ALGARVE,	Faro,	2313.25	137,666
	Faro, Beja,		
Total,		36,046.29	3,693,363

The insular appendages of P. are: The Azores, 1133.79 square miles, pop. (1863) 240,548. Madeira, &c., 330.75 square miles; pop. (1863) 101,420. The total area of the home territories of P. is therefore 37,510.83 square miles, and the population 4,035,330.

The colonial possessions of P. are, in Africa - Cape Verde Isles, 1630.02 square miles, pop. 85,400. Senegambia, 35,437.50 square miles; pop. 1095. Islands of San-Thomé and Príncipe, off Guinea, 448.56 square miles; pop. 12,250. Angola, Benguela, 200,602.50 square miles; pop. 2,000,000. Mozambique and dependencies, 253,500 square miles; pop. 300,000. In Asia - Goa, Salcete, 1410.6 square miles; pop. 363,788. Damao, Diu, 9408 square miles; pop. 44,808. In the Indian Archipelago, 2877 square miles; pop. 850,300. In China - Macao, 11.76 square miles; pop. 29,587. Total of colonies 526,041.48 square miles; pop. 3,687,223.

Physical Aspect, &c. - P. must be regarded as essentially a littoral country, forming the Atlantic or western part of the Spanish peninsula, from which it is separated by political, rather than physical boundaries. Its mountains and rivers are, with few exceptions, mere western prolongations of those of Spain. The principal mountain ranges lie about half-way inland, leaving almost

the whole of its 500 miles of coastline a flat sandy tract, with few rocky headlands, and hence there are scarcely any harbours or places of safe anchorage, except at the embouchures of the larger rivers. The highest range is the Serra de Estrella, which, passing from north-north-east to south-south-west, through Beira and Estremadura, terminates in the steep acclivities of Cintra and Cap la Rocca, near Lisbon. The principal chain, which is also known as the Serra da Junto, merges in a series of ridges, which cover a tract thirty miles in length, between the Tagus and the sea. Another mountain range, named the Serra de Caldeiro and the Serra de Monchique, but constituting a mere continuation of the Spanish Sierra Morena, crosses the southern part of P. from east to west, and terminates in its most southern promontory of Cape St Vincent. These ranges, with the numerous mountain-spurs that intersect the northern districts in every direction, so thoroughly occupy the area of P., that there are only two or three plains of any extent in the whole country, and these are situated to the west of the Guadiana, in Alemtejo, and in Beira and Estremadura, near the Tagus and Vouga. The valleys are very numerous, and by their great fruitfulness, present a striking contrast to the barren and rugged mountains by which they are enclosed. The principal rivers enter P. from Spain. Of these, the largest are the Guadiana, which, leaving Spain near Badajoz, forms in part the boundary between the southern provinces of the neighbouring kingdom; while the Minho and Douro, flowing west, form a part of the boundary in the north and north-east. The Tagus, or Tejo, intersects P. from its northern frontier to the southern termination of the Estrella Mountains, where it enters the sea a little below Lisbon. The Mondego, the largest river belonging entirely to P., after receiving numerous affluents in its course, falls into the sea about midway between the Douro and the Tagus. The larger rivers, although obstructed at their mouth with dangerous bars, afford admirable means of internal navigation, together with the numerous lesser streams, and might through canals be connected into one great system of water-routes; but hitherto nothing has been done to improve these great natural advantages. Except a few mountain tarns, P. has no lakes. It has salt-marshes on the coast, near Setubal in Estremadura, and Aveiro in Beira, whence large quantities of salt are annually obtained by evaporation. Mineral springs are abundant in many parts of the country, but hitherto they have been almost wholly neglected.

The vicinity to the western ocean tempers the climate of P., and exempts it from the dry heat by which Spain is visited. The great inequalities of the surface produce, however, great diversities of climate; for while snow falls abundantly on the mountains in the northern provinces, it is never seen in the lowlands of the southern districts, where spring begins with the new year, and harvest is over by midsummer. Rain falls abundantly, especially on the coast, from October to March, and, as a general rule, the climate is healthy in the elevated districts even of the southern provinces; but malaria and fever prevail in low flat lands and near the salt marshes. The mean annual temperature at Lisbon is 61° Fahr.

The natural products correspond to the diversity of the physical and climatic conditions, for while barley, oats, and wheat, maize, flax, and hemp, are grown in the more elevated tracts, rice is cultivated in the lowlands, the oak thrives in the northern, the chestnut in the central, and the cork, date, and American aloe in the southern parts, while every species of European, and various kinds of

semi-tropical fruits and vegetables, are grown in different parts of the country. The soil is generally rich, but agriculture is everywhere neglected, and is scarcely made subservient to the wants of the population. The cultivation of the vine and that of the olive are almost the sole branches of industry; from the former is derived the rich red wine familiarly known to us as Port, from its being shipped at *O Porto*, 'the port'. The mineral products include gold, antimony, lead, copper, marble, slate, coal, iron, and salt, but of these the last is alone worked in sufficient quantity for exportation, and is in eager demand for the British market, on account of its superior hardness, which adapts it specially for the salting of meat for ships.

The finest cattle are reared in the north, the horses of Alemtejo and the sheep of Beira are most valued. Mules and asses are the principal beasts of burden. Goats and pigs are numerous, and are raised at a very low cost, in all the mountain districts. The rearing of bees and silk-worms is being pursued with somewhat increased energy of late years. Fish is abundant in all the rivers and on the coast. The tunny and anchovy fisheries of Algarve are of considerable importance.

Commerce, &c.—The commercial industry of the country falls very far below its physical capabilities, and Oporto and Lisbon are the only centres of manufacture and trade, the former of which has important silk and glove manufactories, and produces an inconsiderable quantity of linen, cotton, and wool fabrics, metal and earthenware goods, tobacco, cigars, leather, &c. In 1861–1862, 1521 large sea-going and 1106 smaller coasting vessels entered the port of Lisbon; and 1443 of the former, and 984 of the latter, left it. In the same year, 983 vessels entered, and 974 left the port of Oporto. About 600 miles of railway are now open for traffic, principally in the environs of Lisbon, Oporto, Santarem, and Vigo; but the country is almost entirely without roads, the few which exist having been made only within the last twenty years, before which time the whole of the kingdom was in the same impassable condition in which the southern provinces still remain. The scarcity and inefficiency of bridges, and the total want of canals, render internal traffic almost impracticable, and, as a matter of course, put an impassable barrier in the way of the progress of civilisation, and the growth of material prosperity.

The exports, which consist almost entirely of wine, fruits, oil, and cork, amounted in 1856 to about 16,299,035,500 reis, or (taking 1000 reis = 55d.) £3,735,196, and of these, nearly the half were taken by Great Britain and her colonies. The imports for the same year were 20,451,809,800 reis, or about £4,686,873, of which two-thirds came from Great Britain and her colonies.

The budget for 1863–1864 gives the total of the receipts, which are derived from direct and indirect taxation and from the national domains, at 15,371,266,245 reis; while the expenditure, including home and foreign debts, the charges of the state, public works, &c., is estimated at 16,910,350,057 reis; leaving a deficit for the year of 1,539,087,814 reis. The budget for the foreign possessions of P. gives for the same year the receipts at 1,032,113,904 reis; expenditure, 1,328,801,569 reis; deficit, 296,687,665 reis. The national debt, in 1862, including foreign loans, amounted to 149,853,788,545 reis.

Army and Navy.—The army in 1863 was rated at 20,239 men, besides about 4000 men on the retired list, and 1710 men in the municipal guard. The colonial army amounts at present to 13,834 troops, of whom about one-third are stationed in the Indian

representatives of this family, who are, moreover, distinguished as the promoters and upholders of the maritime glory of Portugal. Dinis (Dionysius), who succeeded Alfonso III. in 1279, must be regarded as the founder of Portuguese commerce and mercantile enterprise. This king, moreover, encouraged the industrial arts, and protected learning, in furtherance of which he founded, in 1284, a university at Lisbon, which was transferred, in 1308, to Coimbra. Dinis was succeeded in 1325 by his son, Alfonso, surnamed the Brave, whose reign was almost wholly occupied in wars with the Castilians and the Moslems. With Alfonso's grandson, Ferdinand I., the legitimate branch of the Burgundian House became extinct in 1383. After some disturbances, his illegitimate brother, Joam (John), was recognised by the Cortes as king in 1385. His reign was eventful, not merely on account of the internal reforms which he introduced into the state, and of his steady maintenance of the prerogatives of the crown, but chiefly as being associated with the commencement of those vast and important geographical discoveries and commercial enterprises, to which P. owed the position she occupied during that and the succeeding age as the greatest maritime power of Europe. To Joam's son, Enrique (Henry) the Navigator, is due the merit of having organised various voyages of discovery, and inaugurated a regular system of colonisation, which, during the reign of Joam II. (who ascended the throne in 1481), culminated in the successive acquisition by P. of the Azores, Madeira, Cape de Verde, and other islands; in the doubling of the Cape of Good Hope under Bartholomeo Diaz; and, as the result of the latter, in the successful achievement of the passage by sea to India, which was effected, in 1497, under the command of Vasco de Gama, in the reign of Joam's successor, Manoel. The discovery of Brazil, and the settlements made there and on the western coast of India, increased the maritime power and fame of P., which were further extended under Manoel's son, Joam III., who ascended the throne in 1521. At this period, P. ranked as one of the most powerful monarchies in Europe, and Lisbon as one of its most important commercial cities. Sudden as this course of prosperity had been, its decline was almost more abrupt, and may in a great measure be referred to the influence of the priests, for the introduction into P. of the Inquisition in 1536, led to the expulsion of the numerous wealthy and industrious Jews, on whose able financial management the commercial interests of the Portuguese were largely dependent, and gave rise to an amount of social tyranny and oppression, both in the colonies and at home, which, coupled with a bad system of government, depressed the energy and crippled the resources of the nation. The influence of the Jesuits under the minority of Joam's grandson, Sebastian, and their evil counsels in urging the young king to enter upon a fatal expedition to Africa against the Infidels, led to still further miseries. The defeat of the Portuguese, and the capture and death of their young king at the battle of Alcazar in 1578, and the extinction of the old Burgundian line in 1580, after the brief reign of Sebastian's uncle, Enrique, plunged the country into difficulties and misfortunes of every kind, which lost none of their weight, although they changed in character. After a struggle for the throne between many eager candidates, none of whom found favour with the nation at large, who persisted in cherishing the delusive hope that Sebastian was still alive, and would return from the hands of his Infidel captors, Philip II. of Spain succeeded in securing to himself the crown of P., and annexing the Portuguese kingdom to the Spanish monarchy. This event proved disastrous

in the extreme to P., for, besides bringing the country to the brink of ruin, by mal-administration and misappropriation of its resources, it involved it in all the ruinous wars of Spain in the Low Countries and in Germany, a great part of the expenses of which it was made to bear; while the Dutch, in retaliation for Spanish aggressions at home, attacked the Portuguese settlements in Brazil, and almost completely deprived them of their possessions in the Indian Archipelago. The insolence of Philip IV.'s minister, Olivarez, brought matters to a crisis; and in 1640, after a forced union of 160 years, P. was freed, by a bold and successful conspiracy of the nobles, from all connection with Spain, and the Duke de Braganza, a descendant of the old royal family, placed on the throne, under the title of Joam IV. The war with Spain, which was the natural result of this act, terminated in 1668, when, by the treaty of Lisbon, the independence of P. was formally recognised by the Spanish government. For the next hundred years, P. vegetated in a state of inglorious apathy. Her ancient glory had departed never to return, the nation was steeped in ignorance and bigotry, and from having been one of the greatest maritime powers of Europe, the Portuguese were content with becoming a commercial dependent, rather than ally, of Great Britain. Under the reign of Joseph I., who died in 1777, the genius and resolution of the minister, Pombal (q.v.), infused temporary vigour into the administration, and checked for a time the downward tendency of the national credit. Pombal's efforts to rouse the people from their sloth, and infuse vigour into the government, were frustrated by the accession of Joseph's daughter, Maria, who, with her uncle-husband, Pedro III., allowed things to fall back into their old channels. The mental alienation of Maria led, in 1789, to the nomination of a regency under her eldest son, Joam. This prince, who shewed considerable capacity in early life, finding that he could not maintain even a shadow of independence on the outbreak of the war between Spain and France, threw himself wholly on the protection of England; and finally, when he learned that Napoleon had determined on the destruction of his dynasty, left P. in 1807, accompanied by all his family, and transferred the seat of his government to Rio Janeiro, the capital of Brazil. This act was immediately followed, on the part of the French, by the occupation and annexation of P.—a measure which gave rise to the Peninsular War. The victory of Vimeira, gained by the combined English and Portuguese army in 1808, freed the land from its French assailants; and in 1810, on the death of Queen Maria, the regent succeeded to the joint crowns of P. and Brazil. The continued residence of the new king, Joam VI., at Rio Janeiro, gave occasion to abuses and discontent, which resulted, in 1820, in the outbreak of a revolution at Lisbon, and the proclamation of a constitutional form of government in the place of the pre-existing absolutism. After a period of great national excitement and political disturbance, the differences between the sovereign and people were so far adjusted, that Joam agreed to and signed the constitution of P., and ratified the independence of Brazil, which was to be governed by his son, Dom Pedro, while he himself retained only the title of emperor. On the death of Joam in 1826, Pedro IV., after organising the government of P. on the model of the French charter, renounced the Portuguese crown in favour of his daughter, Dofia Maria da Gloria, on condition of her marriage with her uncle, Dom Miguel. The latter, who, during the lifetime of Joam, had availed himself of

of the poet Garcia de Resende, which gives a general summary and extracts of all the Portuguese poets of the latter half of the 15th, and beginning of the 16th c., affords evidence of this improvement, which is most strongly exemplified in the sentimental pastorals or romances, and the national eclogues of Bernardino Ribeiro and Sá de Miranda, whose eclogues and prose dramatic imitations of Plautus and Terence, mark the transition period between the mediæval lyrical and the later classical style. These first attempts at the drama were followed by Antonio Ferreira, whose *Ines de Castro* is the oldest Portuguese tragedy. But the classical school, whose chief cultivators were the courtiers of Lisbon and the professors of Coimbra, found little favour among the people at large, for the discoveries and conquests of the nation in Asia, Africa, and America, excited an enthusiasm and self-consciousness in the people, which led them to crave for something more practical and natural than the stilted style of the classicists. At this crisis, when P. was at the zenith of her material prosperity, appeared her greatest poet, Camoens, who, in his immortal epic, *Os Lusíadas*, which appeared in 1572, struck out a new path in the domain of epic poetry; while his numerous sonnets, 300 in number, his *Canções* or songs, his *Redondillas*, dramas, and other poetic productions, exhibit a versatility of genius and graceful tenderness which place him in the foremost rank of European poets.

With Camoens and his contemporary, Gil Vicente, the language and poetry of P. reached the culminating point of their development. During the dominion of Spain, the Portuguese so far lost all feeling of national independence and patriotism, that they at length renounced their native tongue, and adopted the language of their foreign rulers. With the restoration of political independence, under the sway of the Portuguese House of Braganza, a reaction took place; but the 17th and 18th centuries produced few Portuguese writers who attained more than an ephemeral and purely local reputation—bombast, or slavish imitation of Spanish and Italian writers, being the predominant characteristics of the Portuguese school of light literature. Some good historical writers belong, however, to this period, as Jacinto Freire de Andrade, whose life of Joao de Castro, Viceroy of India, still holds its place as the most perfect monument of classical prose; the great Indian missionary, the Jesuit Father Antonio Vieira, who died in 1699, and whose sermons and letters—of which a collection was published at Lisbon in 1749, and at Paris in 1838—are regarded by his countrymen as models of style and diction; F. X. da Meneses, the author of *O Portugal Restaurado* (1741), &c. In the beginning of the present century, Portuguese poetry was partially redeemed from its previous low grade by two men, who, although they professed to observe a strictly classical style, possessed a delicacy of taste, and a genial creative power, which saved them from falling into the absurdities that had generally characterised the school in Portugal. The elder of these, F. M. do Nascimento, who died in exile at Paris in 1819, although specially noted as an elegant lyricist, deserves notice for his gracefully written miscellaneous papers; while Manoel de Bocage, his less cultivated rival and contemporary, must undoubtedly be regarded as the most original and truly national of the modern poets of Portugal. His sonnets rank as the finest in the language, and these, with his numerous idylls, epigrams, and occasional poems, composed in various styles and modes of versification, have had a host of imitators, among the best of whom are the dramatist J. B. Gomes, J. M. da Costa e Silva; the satirist, T. da

Almeida; and the Brazilian, Antonio Caldas, distinguished for his sacred epics, and various imitations of Milton and Klopstock. The best of the recent Portuguese poets are M. de Albuquerque, A. de Castilho, and A. de Carvalho, and J. B. d'Almeida Garrett. The last-named, whose collected poetic and prose works appeared at Lisbon in 1840, was at once the most versatile and popular writer of his time in Portugal. In the departments of travels, geography, and history, P. has produced good writers from the earliest periods of its literary history; and in recent times, the works of R. Machado, J. Ferreira, and A. de Cajo, have well maintained the national reputation.—Portuguese literature is also cultivated in Brazil, and, of late years, with more success than in the parent country. The principal names in Brazilian poetry are, Gonçalves Diaz, Macedo Abreo, and Magalhaens; in history, Varnhagen, author of the *Historia general de Brazil* (1854), and P. da Silva, author of the *Brazilian Plutarch*; besides some divines, philosophers, and translators from the classics.

PORTULACÆE, or **PORTULACACEÆ**, a natural order of exogenous plants, nearly allied to *Caryophyllaceæ*, from which it differs chiefly in the generally perigynous stamens, the calyx consisting of two sepals which are united at the base, and the capsule frequently opening transversely. The species are not very numerous; they are much diffused over the world, and are shrubby or herbaceous, generally succulent, mostly growing in dry places. The flowers are often large and beautiful, but ephemeral. The foliage is bland and insipid. Some species are used as salads and pot-herbs, of which the best known is Puralane (q. v.). The tuberous roots of *Claytonia tuberosa*, a Siberian plant, are used for food, as are those of the Melloo (*Melloc tuberosa* or *Ullucus tuberosus*), a Peruvian plant sometimes referred to this order. The genus *Calendrinia* furnishes some beautiful annuals to our flower-borders.

POSEIDON. See NEPTUNE.

POSEN, a province of Prussia, bounded N. by Pomerania and East Prussia, E. by Poland, S. by Silesia, and W. by Brandenburg and Pomerania. Area, 11,260 square miles. Pop. at the close of 1861, 1,485,550. It is divided into the two governmental districts of Posen and Bromberg; and the principal towns are Posen, Bromberg, Gnesen, Lissa, and Inowracław. The principal river is the Wartha, which traverses P. from east to west, and is navigable throughout the greater part of its course, as is also the smaller Netza. The country is almost everywhere level, and its surface extensively covered with bogs, ponds, and small lakes. The soil is on the whole fruitful, and the numerous swamps and forests which covered the land during its annexation to Poland, have of late years been converted into rich meadow and good arable land, where cattle of superior quality are raised, and good crops of wheat, barley, oats, and flax are procured. The forests are extensive and productive, and contribute largely to the exports of the province, of which, however, the most important articles are corn, wool, tallow, hides, wax, and honey. With the exception of coal, which is obtained from beds near the town of Wronki, P. has no mineral products. Good broad-cloth, linens, and lace are manufactured in many of the small country-towns. Since the annexation of P. to Prussia, much has been done to supply the previous deficiency in regard to popular instruction; and there are now six gymnasias, several normal and training schools, a seminary for priests, and upwards of 2000 burgher and national schools. Nearly half the entire

The outlines of a new printing-process have recently been given to the world, which, for facility of manipulation, bids fair to supersede all others. The process is patented; it consists in coating good photographic paper with collodion, having salts of uranium and silver dissolved therein; the paper is then dried in the dark, when it is ready for printing. No *over-printing* is necessary, as no subsequent reduction takes place in the after-processes of toning and fixing. The toning is effected by immersion in a solution of chloride of gold, palladium, or platinum; by the use of which salts, and by varying the proportion of uranium in the collodion, also by varying the time of exposure, and the density of the negative, any desired tone may be obtained. Absolute permanency is claimed as one of the qualities of pictures printed by this process; this is, however, a point which time alone can determine.

A process of printing in carbon, lamp-black, or other impalpable powder, although at present (1865) surrounded by some manipulatory difficulties, possesses too many of the conditions calculated to insure that important desideratum, permanency, to be passed over without notice. The principle was first indicated by Mungo Ponton, and has since been experimented on by Portevin, Pouncy, Fargier, Gamia, and Salmon and Swan. In Pouncy's process, which may be regarded as a type of all the rest, an impalpable powder of lamp-black is intimately mixed with equal parts by increase of saturated solutions of gum-arabic and bichromate of potash. A uniform layer of this mixture is spread by means of a camel's hair-pencil on paper, and allowed to dry; it is then exposed under a negative from four to eight minutes, after which it is floated on water, impression side downwards, for five or six hours, and finally washed under the tap, and dried. The gum is rendered insoluble by the oxidising influence of the bichromate, just in proportion as the light has penetrated the negative, and in exactly the same proportion those parts protected from the solar action are dissolved and washed off. Portevin, in speaking of his method, says: 'I apply different colours, either liquid or solid, to the paper fabric, glass, or other surfaces, by mixing these colours with the bichromate and organic matter.' Other experimenters have substituted bichromate of ammonia for bichromate of potash, and gelatine for gum. The principle of this printing-process will be seen, on reference, to be similar to that involved in Photo-galvanography. See PHOTOGRAPHY.

POSSE COMITATUS means the whole force of the county, consisting of knights and men above the age of 15, with constables, who attend the orders of the sheriff to assist in enforcing process or quelling riots. Justices of the peace can also, if apprehensive of an organised resistance, command the services of the posse comitatus, and it is the sheriff's duty to raise the necessary number of men. But practically, in modern times, constables and special constables are all the assistance given or required.

POSSESSION OF PROPERTY, in point of law, is the most intimate relation that can subsist between the owner and his property. Strictly speaking, the idea of property consists merely of a certain relation between a human being and a portion of external nature, whereby he appropriates to himself all the ordinary uses of which such external nature is capable. If it is land, he reaps the fruits, and excludes all other persons from interfering with his operations; if it is a chattel, he keeps it under his exclusive control. Possession, therefore, is nothing but the legal result of the relation of property. Possession, though originally constituting

the whole substance of property, has, as civilisation advanced, become a separable part of it; and while the radical right is now the ownership, the possession is viewed as an incident of such ownership. It is now not only separable but saleable, and constitutes the foundation of the contract between landlord and tenant, whereby the owner, by way of a lease, sells for a limited period the exclusive use, otherwise called the possession. So long, therefore, as an owner exists, he has, as a necessary consequence, the right, more or less immediately and directly, to the possession of property. When all record of ownership is lost, then the law permits a resort to first principles, and allows any person who has been in possession for a limited time to retain it, and so ultimately acquire the ownership. If the possession is suddenly or wrongfully interfered with, the usual remedy, in England, to recover possession of real property, such as land or houses, is an action of ejectment; if the property is a chattel, it is an action of trover or detinue. But the possession may be recovered also by other modes. See also OWNERSHIP and LOST PROPERTY.

PO'SSET, a dietetic preparation, made by curdling milk with some acidulous liquor, such as wine, ale, or vinegar. White wine or sherry is usually preferred, but sometimes old ale is used. The milk is boiled; and whilst it is still on the fire, the acidulous matter is added; if sherry, about a wine-glassful and a half to the pint of new milk is the proportion; or twice the quantity if ale. A teaspoonful of vinegar or of lemon-juice is sometimes used instead; one or two tablespoonfuls of treacle are added, to sweeten. Taken at bedtime, it is used for colds and coughs.

POST-CAPTAIN, an obsolete title applied to captains in the royal navy: it has been disused for many years. See CAPTAIN.

POSTE RESTANTE (Fr., to remain at the post-office till called for), a usual mode of addressing letters to persons who are merely travelling in, or passing through, a country in which they have no fixed residence. English travellers on the continent have very generally their letters so addressed to some town through which they expect to pass. The *poste restante* office is open at certain hours, and the letters are given out when called for, production of a card, passport, or other evidence of identity being sometimes required. Letters unclaimed for a certain time are opened, and either destroyed or returned to their writer. There is a *poste restante* office in London, under stringent regulations as to the conditions on which letters are given out. If the applicant for a letter be a British subject, or subject of a state not issuing passports, he must state the place from which he expects letters, and he, or the messenger who applies for him, must be provided with some proof of identity. If he be the subject of a country which issues passports, his passport must be produced. In the provincial post-offices of Great Britain, commercial travellers, tourists, and persons without a settled residence, may have their letters addressed *poste restante*, and they are kept at the post-office till called for; but residents are not allowed to have their letters so addressed, and the post-office authorities have orders to deliver them. In the British post-office, letters addressed *poste restante* are kept one month, and then returned to the writer through the dead-letter office.

POSTERN, in Fortification, is a small doorway communicating usually through the flank of a bastion between the fort and the ditch. Its object is to afford unseen egress to troops marched out to relieve sentries on the external works, to make

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under the Protectorate in 1656, and re-enacted by 12 Car. II. c. 35. It ruled that there should be one general post-office and one postmaster-general for England, who was to have the horsing of all through posts and persons riding post. A tariff was established for letters, English, Scotch, Irish, and foreign, and the only non-governmental posts allowed to continue were those of the universities and the Cinque Ports.

In 1685, a penny-post was set up for the conveyance of letters and parcels between different parts of London and its suburbs. It was a private speculation, originating with one Robert Murray, an upholsterer, and assigned by him to Mr William Docwray. When its success became apparent, it was complained of by the Duke of York, on whom the post-office revenues had been settled, as an encroachment on his rights; a decision of the Court of King's Bench adjudged it to be a part of the royal establishment, and it was thereupon annexed to the crown. In this way began the London district-post, which was improved and made a twopenny-post in 1801, and continued as a separate establishment from the general post down to 1854.

The first legislative enactment for a Scottish post-office was passed in 1695, prior to which time, the posts out of Edinburgh had been very few and irregular. About 1700, the posts between the capitals were so frequently robbed near the borders, that acts were passed both by the parliament of England and that of Scotland, making robbery of the post punishable with death and confiscation. The post-office of Ireland is of later date than that of Scotland. In the time of Charles I, packets between Dublin and Chester, and between Milford-Haven and Waterford, conveyed government dispatches; and after the Restoration, the rate of letter-postage between London and Dublin was fixed at 6d.

Act 3 Anne, c. 10, repealed the former post-office statutes, and put the establishment on a fresh basis. A general post-office was instituted in London for the whole British dominions, with chief offices in Edinburgh, Dublin, New York, and other places in the American colonies, and one in the Leeward Islands. The whole was placed under the control of an officer appointed under the Great Seal, called the Postmaster-general, who was empowered to appoint deputies for the chief offices. Rates higher than those formerly charged were settled for places in the British dominions, and also for letters to foreign parts. A survey of post-roads was ordered, for the ascertainment of distances. Letters brought from abroad by private ships were ordered to be handed over to the deputy-postmasters of the ports, who were to pay the master a penny for each letter. A complete reconstruction of the cross-post system was effected in 1720, by Ralph Allen, postmaster of Bath, to whom the Lords of the Treasury granted a lease of the cross-posts for life: at his death, they came under the control of the postmaster-general. The rates of postage were further raised by act 1 Geo. III. c. 25, which also gives permission for the establishment of penny posts in other towns, as in London. The Edinburgh penny-post was instituted in 1766, by one Peter Williamson, a native of Aberdeen, whom the authorities induced to take a pension for the good-will of the concern, and merged it in the general establishment.

Mail-coaches owe their origin to Mr John Palmer, manager of the Bath and Bristol theatres, who, in 1783, submitted to Mr Pitt a scheme for the substitution of coaches, protected by armed guards, for the boys on horseback, who till then conveyed the mail. After much opposition from the post-office authorities, his plan was adopted, and Mr Palmer,

installed at the post-office as controller-general, succeeded in perfecting his system, greatly increasing the punctuality, speed, and security of the post, and adding largely to the post-office revenue.

In 1837, a plan of post-office reform was suggested by Mr (now Sir) Rowland Hill, the adoption of which has not only immensely increased the utility of the post-office, but changed its whole administration. Its principal features were the adoption of a uniform and low rate of postage, a charge by weight, and prepayment. The change met with much opposition from the post-office authorities, but was eventually carried by a majority of 100 in the House of Commons, becoming law by 3 and 4 Vict. c. 96. The new system came into full operation on January 10, 1840. Previously to the change, members of parliament had the right of sending their letters free, but this privilege of franking was entirely abolished. A penny was adopted as the uniform rate for every inland letter not above half an ounce. Facilities for prepayment were afforded by the introduction of postage-stamps, and double postage was levied on letters not prepaid. Arrangements were made for the registration of letters; and the money-order office, by a reduction of the commission charged for orders, became available to an extent which it had never been before. As far back as 1792, a money-order office had been established as a medium for sailors and soldiers to transmit their savings, and its benefit had afterwards been extended to the general public; but the commission charged had been so high, that it was only employed to a very limited extent. The immediate result of the changes introduced in 1840 was an enormous increase in the amount of correspondence, arising in part from the cessation of the illicit traffic in letters, which had so largely prevailed before; but for some years there was a deficit in the post-office revenue. The reduction of postage-rates was, however, a reduction of taxation, and if the Exchequer lost revenue from one source, it gained it in other ways.

Since the adoption of Sir Rowland Hill's system, the most important changes in the post-office are those which have arisen from the absorption of the whole traffic of the country by railways, and their substitution for mail-coaches in the conveyance of letters. This has greatly increased the expenses of the post-office establishment; notwithstanding which, the former gross revenue of the post-office was exceeded in 1851, and the net revenue in 1863.

According to the latest returns, there are 11,316 post-offices in the United Kingdom, of which 808 are head-offices, and 10,508 sub-offices. To these must be added a large number of road letter-boxes, making in all 14,776 public receptacles for letters—at least 10,000 more than existed under the former system. The total number of letters which passed through the post-office in 1863 was 642,000,000, an eight-fold increase from the last year of dear postage. The gross revenue of the post-office in 1863 was £3,800,000, to which should be added £130,000 for the impressed stamp on newspapers sent through the post; the expenditure £3,000,000, and the clear revenue £900,000. The amount of money transmitted by post-office orders in 1839 was £313,000; in 1863, £16,494,000.

The postal service of the three kingdoms is now under the immediate control of the postmaster-general, assisted by the general secretary of the post-office in London. There are also chief officers in Edinburgh and Dublin, with secretarial and other departmental staffs. The postmaster-general is a peer, a member of the privy-council, and generally a cabinet minister. He has a salary of £2500, and is the only officer connected with the department

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postage. The post-office is not responsible for the absolute security of registered letters.

Foreign and Colonial Letters.—For the rates payable, reference is made to the *British Postal Guide*. Prepayment must be either wholly in stamps or wholly in money. In some cases, prepayment is optional; in others, compulsory. When optional, an outward letter, posted with an insufficient number of stamps, is charged the deficient postage in addition, except where it has to go to Holland, the United States, or to any country through France, in which case it is treated as wholly unpaid. Where prepayment is compulsory, an insufficiently prepaid letter goes to the Returned letter-office, to be returned to the sender. Insufficiently paid letters for Russia and Poland are treated as wholly unpaid. Letters to and from Ceylon, Australia, New Zealand, the British West Indies, Honduras, and St Helena, posted wholly unpaid, or paid less than one rate, are returned. If paid one rate, where chargeable with more, they are forwarded, charged with the deficient postage and 6d. of fine. Letters for New Zealand must be fully prepaid. Letters for the remaining British colonies, wholly or partially unpaid, are charged 6d. in addition to the ordinary postage.

Letters to be sent by private ship must be so marked; their postage is 6d. for half an ounce, and (except to the North American and African colonies) they must be prepaid.

Letters to passengers on board the Cunard or Mediterranean packets must be registered, and should be addressed to the care of the officer in charge of the mails.

The post-office monopoly is applicable to letters only; and it does not include letters sent specially by private messenger.

Newspapers.—Newspapers stamped with the *unpressed stamp* are charged one penny for two sheets, three-halpence for three sheets, and twopence for four sheets of printed matter. The title and date must be printed at the top of each page. The stamp must be visible outside, otherwise a fine of one penny is exacted in addition to the postage. The newspaper is required to be not above 15 days old. The cover, if there is one, must be open at both ends, and there must be no writing outside or inside, except the address of the person to whom the newspaper is sent.

A newspaper to be sent abroad must be first registered at the General Post-office. Newspapers intended for transmission to the colonies or foreign countries, must be prepaid with *postage-stamps*, although they are otherwise liable to the same regulations as English newspapers bearing impressed stamps.

Parliamentary proceedings.—The printed proceedings of parliament, with the words 'Parliamentary Proceedings' written or printed on the cover, may circulate throughout the United Kingdom at the following rates, of which prepayment is optional—viz., when weighing not more than 4 oz., 1d.; between 4 and 8 oz., 2d.; and so on—a penny being charged for every additional quarter of a pound or fraction of a quarter of a pound.

Book-post.—This branch of the post-office was first established in 1848, and further improved by regulations issued in 1855 and 1857. Books and printed or written matter of any kind, except letters, prints, maps, photographs, and all matter which may be sent by the newspaper-post, or as parliamentary proceedings, may now be sent through the book-post at the following rates: below 4 oz., 1d.; between 4 oz. and 8 oz., 2d.; between 8 oz. and 1 lb., 4d.; and so on—2d. being charged for every additional half-pound or fraction of

a half-pound. A book-packet must be prepaid, and with postage-stamps; if insufficiently paid, it is charged an additional rate over and above the deficiency; and if altogether unpaid, it is charged as an unpaid letter. If there is a cover, it must be open at the ends. No book-packet must exceed two feet in length, width, or depth, nor must it contain anything sealed against inspection. An entry on the first page of the book stating who sends it is allowed, and even recommended. No writing in the way of a letter or communication is allowed; if any such communication be found within a packet, and forming a component part of it, the whole will be charged the unpaid letter rate, and forwarded. If, however, the communication can be separated from the packet, it will be taken out, and forwarded alone, and the remainder of the packet delivered free. The book-post has been extended to all the colonies.

Pattern-post.—Parcels containing patterns of merchandise may be forwarded at the following fixed rates, prepaid with stamps: if under 4 oz. weight, 3d.; between 4 oz. and 8 oz., 6d.; between 8 oz. and 1 lb., 1s.; and so on—6d. being charged for every additional half-pound or fraction of half a pound. The pattern must not be of intrinsic value, nor must it contain writing inside, except the address or trademark of the manufacturer, and the numbers or price of the articles sent. The patterns are to be sent in covers open at the ends or sides; but samples of articles which cannot be placed in open covers, may be enclosed in bags, so tied that they can be opened at the post-office. Articles by which the contents of a letter-bag might be damaged, are prohibited to be sent in this way.

Money Orders.—Inland money orders may be obtained at any of the post-offices of the United Kingdom, on payment of the following commission: for a sum not exceeding £2—3d.; from £2 to £5—6d.; from £5 to £7—9d.; from £7 to £10—1s. The commission on orders payable at Gibraltar and Malta is three times, and on orders payable in the other colonies, four times the above rate. In applying for a money order, the surname and initial, at least, of one Christian name of the sender, and the name of the person to whom payable, must be given; but the designation of a firm will suffice, and the name of the person to whom the order is payable may be withheld, if it is to be paid through a bank. A money order in the United Kingdom becomes lapsed, if not presented for payment before the end of the second calendar month after that in which it was issued. A second commission for a new order will, after that time, be necessary. In the colonies, six months are allowed. If an order is not paid before the end of the twelfth calendar month after that in which it was issued, all claim to the money is lost. Sums accruing to the revenue from lapsed orders, go into a fund for assisting officers of the post-office to pay their premiums on life-assurance policies.

Petitions to Her Majesty or either House of Parliament (if open at the ends), and letters on the business of the post-office to the head-office or the district-surveyors, may be sent free.

Any person with a fixed residence may have a private box at the post-office on paying an appointed fee; but in no other case can a resident have his letters addressed to the post-office. See **POSTS RESTANTS**.

The postal system of France dates from the time of Louis XI.; but the posts were at first exclusively for the royal service, and only gradually became available for private correspondence. It was not till 1672 that any settled revenue accrued

taken with past. Now, although a remembrance that is long past is often uncertain, a recent remembrance must be pronounced absolutely certain, not less than a present consciousness. That 'I was thirsty a short time ago,' I must be certain of, in order to establish the induction, 'that water quenches thirst.' 3. It must further be conceded, that 'What has been in the past, all circumstances holding the same, will be in the future.' That a thing has been, does not imply that it will be. We may admit that the sun has risen to-day, and rose yesterday, and so on, and without inconsistency, refuse to admit that it will rise to-morrow. People are generally well enough disposed to treat this as a certainty; indeed, there is a strong natural tendency of the mind to expect that the future will resemble the past, which, when corrected and regulated by experience, constitutes our belief in causation and the uniformity of nature. Still, a blind instinct is no guarantee for truth; and as the assertion of the future is a distinct position, it should be formally assumed in a separate postulate. However often a thing may have happened, we still make a leap, and, so to speak, incur a risk in venturing to predict its future recurrence. Our confidence no doubt increases with repetition, but nothing can obliterate the line between what *has been* and what *is to be*.

These three Postulates of Experience, coupled with the Postulate of Consistency, seem adequate as a basis of all the recognised axioms and truths of experience. In other words, the concession of them is enough to commit any one to the reception of all inductive and deductive evidence.

POSTULATION (Lat. 'an asking'), in Canon Law, means a presentation or recommendation addressed to the superior, to whom the right of appointment to any dignity belongs, in favour of one who has not a strict title to the appointment. It is one of the forms of proposing to the pope persons nominated, but not, strictly speaking, elected, to a bishopric. It is also used in the case of elections in which the candidate, although regularly chosen by the electors, yet labours under some legal disability which involves the necessity of a dispensation. The presentation of candidates for the episcopacy, as it exists in the Roman Catholic Church in Ireland, is called postulation.

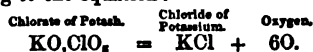
POSTURES, the name given to the attitude observed in worship, whether private or public, but especially the latter. They are the natural expressions of the feeling which accompanies or characterises the particular devotion in which they are employed, and are used by suppliants to man as well as to God. Four postures are found to have been used by the ancient Christians in their prayer—the standing, the kneeling, the bowing or inclined, and the prostrate. Of these, the ordinary one was kneeling; but for it was substituted, during the Easter-time and on the Sundays, a standing posture, which was understood to symbolise the resurrection of our Lord. To this usage we find allusions as early as the time of Justin the Martyr. In the paintings of the catacombs, and on the ancient enamelled glasses found therein, the standing posture in prayer is accompanied by outstretched and upraised hands. The bowing posture was rather a special act of reverence accompanying a particular address or a particular part of an address, than a sustained posture. It occurred at frequent intervals in the ancient liturgy, and is still used in the Roman mass as well as (even more profusely) in those of all the various rites, Greek, Syrian, Coptic, Armenian, and Russian. The prostrate posture was the attitude of the deepest humiliation,

and was mainly used by the Penitents (q. v.), especially in that grade of public penance which was known under the name 'prostration.' It is also used still in the solemn ordination of subdeacons, deacons, and priests, as performed in the Roman Catholic Church. The question as to the use of particular postures was a subject of much controversy between the Puritans and the Church of England; and has recently been revived in the Presbyterian Church of Scotland.

POTASH AND PEARL-ASH, in Commerce. See **POTASSIUM**. The chief source of this important article in Britain is Canada, where it is derived from the vast quantities of wood cut down and burned in clearing the forest for culture, and also from the branches of the trees felled for timber. The ashes, mixed with a small quantity of quicklime, are put into large wooden cisterns, and covered with water. The whole is well stirred up, and allowed to settle; the next day, the clear liquor is drawn off, and evaporated to dryness in iron pots, whence it is called *potash*. When a sufficient quantity is got to fill a cask of 5 cwt., it is fused at a red heat, and poured into the cask. The mass when cold is coloured gray externally, but when broken, shews a pinkish tint internally. It is very deliquescent, and consequently the casks require to be nearly air-tight. In this state, potash contains a large quantity of foreign materials, amounting to about 40 per cent., amongst which sulphur and carbonaceous matter predominate. This is the crude American potash of commerce. If it is calcined by a reverberatory furnace, the sulphur is driven off, and the carbonaceous matter burned out; the carbonic acid, however, combines with the potash, and forms it into a carbonate. To form it into *pearl-ash*, it is then broken up, and dissolved in water in a wooden cistern, having a perforated bottom, covered with straw, through which it filters, and is afterwards evaporated in flat-bottomed iron pans. As it approaches dryness, it is stirred with iron rods, which break it up into round lumpy masses of a pearly-white colour, and in this state it is the *pearl-ash* of commerce, and contains about 50 per cent. of pure potassa. All land-plants yield potash when burned, and many in much greater proportions than the timber-trees of North America; but the circumstances in which the materials are obtained, give an advantage to our colonial manufacturers, which hitherto has enabled them to compete with the whole world. The quantity imported annually of 'pots' and 'pearls,' as they are technically called, reaches the value of nearly half a million sterling. See **POTASSIUM**.

POTASSIUM (symb. K, equiv. 39, sp. gr. 0.865) is one of the alkaline metals. The letter K is selected as its symbol, as being the first letter of *Kali*, the Arabic word for potash, the letter P being preoccupied as the symbol for phosphorus. The following are the chief characters of this metal. It is of a bluish-white colour, and presents a strong metallic lustre. At 32°, it is brittle, and has a crystalline fracture; at a somewhat higher temperature, it is malleable; at 60°, it is soft, and of the consistence of wax; at 130°, it is completely liquid; and at a red heat, it becomes converted into a beautiful green vapour. Its affinity for oxygen is so great, that on exposure to the air, it immediately becomes covered with a film of oxide. When heated, it burns with a violet flame. Its intense affinity for oxygen is well shewn by throwing it into water, on which, from its low specific gravity, it floats. The metal abstracts oxygen from the water, and forms oxide of potassium (potash); while the liberated

important of these salts. *Carbonate of Potash* (K_2CO_3) is obtained by burning plants in dry pits, dissolving the ashes in water, evaporating till the sulphates, chlorides, &c., separate in crystals, and then boiling the mother liquid to dryness in iron pots. See *POTASH*. The quantity of pure carbonate of potash contained in it is liable to great variation, and the process termed *Alkalimetry* has been invented, with the view of rapidly determining the amount of this salt, on which the commercial value of the pearl-ash depends. Different plants furnish varying quantities of this salt, and the leaves and young shoots are the parts which furnish it most abundantly. The potash is, of course, obtained by the plants from the soil, which, when capable of supporting vegetable life, always contains that substance; and does not exist in the plants in the form of carbonate, but in union with various organic acids (such as acetic, malic, tartaric, and other acids), which, by incineration, become decomposed into carbonates. The purified carbonate of potash, employed in pharmacy and for chemical purposes, is prepared from the crude salt by adding an equal quantity of cold water, agitating, and filtering. By this means, all the less soluble foreign bodies are got rid of. The solution is then boiled down to a small bulk, and allowed to cool, when the carbonate separates in small crystals, containing 20 per cent. of water, and represented by the formula $\text{K}_2\text{CO}_3 + 2\text{Aq}$. Carbonate of potash is extremely deliquescent, and is soluble in less than its own weight of water, but is insoluble in alcohol. It has an acrid, alkaline taste, and its reaction upon test-paper is strongly alkaline. It is a compound of great importance, both as a chemical re-agent, and as entering largely into the preparation of most of the other compounds of potash, and into the manufacture of soap and glass. *Bicarbonate of Potash* ($\text{K}_2\text{CO}_3 + \text{H}_2\text{CO}_3$) is obtained in white rhombic prisms, by passing a current of carbonic acid gas through a strong solution of carbonate of potash. These crystals are permanent in the air, but are decomposed by heat; water and carbonic acid being evolved, and the simple carbonate left. This salt is much less soluble than the carbonate, requiring four parts of cold water for its solution, which is nearly neutral to test-paper, and has a much milder taste than the preceding salt. It is employed largely in medicine for making effervescent draughts. *Sulphate of Potash* (formerly known as *sul polychrest*) is obtained by dissolving in water the acid residue of bisulphate of potash ($\text{K}_2\text{SO}_3 + \text{H}_2\text{SO}_3$) which is left in the retort in the preparation of nitric acid. This solution, on being neutralised with carbonate of potash, furnishes hard transparent crystals of this salt. From its extreme hardness, this salt is used in medicine (as, for example, in *Dover's Powder*), for the purpose of finely comminuting vegetable matters. The *Bisulphate of Potash*, from which the preceding salt is obtained, is the *sul emixum* of the older chemists. Except that it is occasionally employed as a flux it is of no special importance. *Nitrate of Potash* has been already described under the head *NITRE*. *Chlorate of Potash* (K_2ClO_3) occurs in white rhomboidal tablets of a pearly lustre. It has a cooling taste like that of nitre. It fuses at a gentle heat without decomposition, but on increasing the heat, it gradually gives off all its oxygen, and is converted into chloride of potassium, according to the equation:



It is not very soluble, as it requires for its solution 16 parts of cold and 1.7 parts of boiling water. It even exceeds nitrate of potash as an oxidising

agent; and if combustible substances, such as carbon, sulphur, or phosphorus be heated, or forcibly rubbed with it, a detonation or explosion occurs. This salt is employed in the manufacture of lucifer-matches, in certain operations in calico-printing, and for filling the friction-tubes employed for firing cannon: the best mixture for these tubes consisting of 2 parts of this salt, 2 of sulphide of antimony, and 1 of powdered glass. A mixture known as *White Gunpowder*, consisting of chlorate of potash, dried ferrocyanide of potassium, and sugar, has been employed for blasting purposes, but its preparation is accompanied by so much danger, that it is seldom used. This salt does not occur as a natural product, but may be obtained by passing a current of chlorine gas through a hot solution of caustic potash; 6 eq. of chlorine combining with 6 eq. of potash to form 5 eq. of chloride of potassium, and 1 eq. of chlorate of potash, according to the equation: $6\text{Cl} + 6(\text{K}_2\text{O},\text{H}_2\text{O}) = 5\text{KCl} + \text{K}_2\text{ClO}_3 + 6\text{H}_2\text{O}$. The two salts are easily separated by crystallisation, as the chlorate is comparatively insoluble, and the chloride extremely soluble. *Hypochlorite of Potash* (K_2ClO) can only be obtained in solution. Under the title of *Eau de Javelle*, it is sold as a bleaching agent. It is obtained by passing chlorine gas through a cold dilute solution of carbonate of potash, when chloride of potassium and hypochlorite of potash are formed, from which the chloride may be removed by crystallisation. The *Phosphates of Potash*, formed by the different varieties of phosphoric acid, are sufficiently noticed in the articles *PHOSPHATES* (in *Physiology*) and *PHOSPHORUS*. The *Silicates of Potash* are important compounds in connection with the manufacture of glass; they also enter into the composition of Fuch's *Water-glass*, or *Soluble Glass*, and have been employed by Ransome and others as a coating by which the decay of magnesian and other limestones may be prevented. The *Chromate* and *Bichromate of Potash* are sufficiently noticed in the article *CHROMIUM*. The haloid salts of potassium may be passed over very briefly. The *Chloride of Potassium* (KCl) is obtained in large quantity in the preparation of chlorate of potash, or may be procured by burning potassium in chlorine gas, when the result of the brilliant combustion which takes place is this salt. In its general characters, it closely resembles common salt (NaCl), except that the former communicates a violet, and the latter a yellow tint to the flame of alcohol. It is a constituent of sea-water, of salt marshes, and of many animal and vegetable fluids and tissues. The *Bromide* and *Iodide of Potassium* are sufficiently noticed in the articles *BROMINE* and *IODINE*. *Fluoride of Potassium* (KFl) possesses the property of corroding glass. There are no less than five *sulphides of potassium*, commencing with the proto-sulphide (KS), and terminating with the penta-sulphide (KS_5). The latter is the main ingredient in the *Hepar sulphuris*, or *Liver of sulphur*, used in medicine. It is a brown substance, obtained by fusing, at a temperature not exceeding 432° , 3 eq. of potash and 12 eq. of sulphur, the resulting compounds being 2 eq. of pentasulphide of potassium (2KS_5), and 1 eq. of hyposulphite of potash ($\text{K}_2\text{S}_2\text{O}_3$). From this mixture, the pentasulphide may be removed by alcohol, in which it dissolves. The *Yellow* and the *Red Prussiate* (or the *Ferrocyanide* and *Ferridcyanide*) of Potash are noticed in the articles *FERROCYNANOGEN* and *FERRIDCYNANOGEN*. The *Cyanide of Potassium* (KCy) may be procured by heating potassium in cyanogen gas, when brilliant combustion occurs, and the resulting product is this salt. It may, however, be more cheaply and easily prepared by Liebig's process, which does not, however, yield it pure, but mixed with cyanate of

draught. It may be taken in doses of a scruple or half a drachm in solution every few hours. The therapeutic uses of *nitrate of potash* are noticed in the article NITRE. *Sulphate of potash* (K_2SO_4) is useful as a mild laxative, a scruple of this salt, especially if combined with ten grains of rhubarb, usually acting mildly and efficiently. It has considerable power in repressing the secretion of milk, and has been much used for this purpose. The reason why it is an ingredient of Dover's Powder, has been already noticed.

The uses of the *tartrates of potash* are noticed in the article TARTARIC ACID. *Bromide of Potassium* (KBr) occurs in white, transparent, cubical crystals, and is occasionally employed in enlargement of the spleen and in certain forms of epilepsy. The uses of *iodide of potassium* are described in the article IODINE.

POTA'TO (*Solanum tuberosum*; see SOLANUM), one of the most important of cultivated plants, and in universal cultivation in the temperate parts of the globe. It is a perennial, having herbaceous stems, 1—3 feet high, without thorns or prickles; pinnate leaves with two or more pair of leaflets and an odd one, the leaflets entire at the margin; flowers about an inch or an inch and a half in breadth, the wheel-shaped corolla being white or purple, and more or less veined; followed by globular, purplish fruit, of the size of ordinary gooseberries; the roots producing tubers. The herbage has a slightly narcotic smell, although cattle do not refuse to eat a little of it, and the tender tops are used in some countries like spinach. The tubers are, however, the only valuable part of the plant.

The P. is a native of mountainous districts of tropical and subtropical America, probably from Chili to Mexico; but there is difficulty in deciding where it is really indigenous, and where it has spread after being introduced by man. Humboldt doubted if it had ever been found truly wild; but subsequent travellers, of high scientific reputation, express themselves thoroughly satisfied on this point. Except that the tubers are smaller, the wild plant differs little from the cultivated. Maize and the P. are the two greatest gifts which America has given to the rest of the world. The P. has been cultivated in America, and its tubers used for food, from times long anterior to the discovery of America by Europeans. It seems to have been first brought to Europe by the Spaniards, from the neighbourhood of Quito, in the beginning of the 16th c., and spread from Spain into the Netherlands, Burgundy, and Italy, but only to be cultivated in a few gardens as a curiosity, and not for general use as an article of food. It long received throughout almost all European countries the same name with the Batatas (q. v.), or Sweet Potato, which is the plant or tuber meant by English writers down to the middle of the 17th c., in their use of the name potato. It appears to have been brought to Ireland from Virginia by Hawkins, a slave-trader, in 1565; and to England by Sir Francis Drake, in 1585, without attracting much notice, till it was a third time imported from America by Sir Walter Raleigh in 1623. It was still a long time before it began to be extensively cultivated. Gerard, in his *Herbals*, published in 1597, gives a figure of it under the name of *Batata Virginiana*; but so little were its merits appreciated, that it is not even mentioned in the *Complete Gardener* of London and Wise, published more than a century later, in 1719; whilst another writer of the same time says it is inferior to skirret and radish! It began, however, to be imagined that it might be used with advantage for feeding 'swine or other cattle,' and by and by that it might be useful for poor people, and for

the prevention of famine on failures of the grain-crops. The Royal Society took up this idea, and in 1663, adopted measures for extending the cultivation of the P., in order to the prevention of famines. To this the example of Ireland in some measure led, the P. having already come into cultivation there, to an extent far greater than in any other European country, and with evident advantage to the people. From Ireland, the cultivation of the P. was introduced into Lancashire about the end of the 17th c., soon became general there, and thence spread over England; so that, before the middle of the 18th c., it had become important as a field-crop, which it became in the south of Scotland some 20 or 30 years later; about the same time, in Saxony and some other parts of Germany; but not until the latter part of the century, in some other parts of Germany and in France. In France, the extension of P. culture was very much due to the exertions of Parmentier. In some parts of Germany, the governments took an interest in it, and promoted it by compulsory regulations.

The P. is of great importance as affording food both for human beings and for cattle; and next to the principal cereals, is the most valuable of all plants for human food. It is also used for various purposes in the arts. No food-plant is more widely diffused; it is cultivated in subtropical countries; and struggles for existence in gardens, even within the arctic circle, yielding small and watery tubers; although the effects of late spring frosts, or early autumnal frosts, upon its foliage, often prove that it is a plant properly belonging to a climate milder than that of most parts of Britain. No more important event of its kind has ever taken place than the general introduction of P. culture into the husbandry of Britain and other European countries. It has exercised a most beneficial influence on the general welfare of the people, increasing national wealth, and preventing, as a few far-seeing thinkers had anticipated, the once-frequent returns of famine. That in 1846 and 1847, terrible famine resulted in Ireland and elsewhere from the failure of the P. crop itself, was owing only to the excess to which its cultivation had been carried. The results confirmed two great laws, that plants long very extensively or almost exclusively cultivated in any district, however successfully they may be cultivated for a time, are sure to fail at last; and that the exclusive, or almost exclusive dependence of a people on one source or means of support, is unfavourable to their welfare in respect to all their interests.

Humboldt calculates that the same extent of ground which would produce thirty pounds of wheat, would produce one thousand pounds of potatoes. But potatoes are not nearly so nutritious as wheat, and the constant employment of them as the chief article of food, is not favourable to the development of the physical powers, and is consequently in its protracted influence unfavourable to mental energy. All this is too well illustrated in Ireland and the Highlands of Scotland, in a race capable of the highest development of both. It is calculated that 100 parts of good wheat-flour, or 107 parts of the grain, contain as much actual nutriment as 613 parts of potatoes. The inferiority of the P. in nutritious power is very much owing to the comparatively small quantity of nitrogenous substances which it contains, in consequence of which it is most advantageously used along with some very nitrogenous article of food, in Britain generally with animal food, in some parts of Europe with curds or with cheese. The P. tuber, in a fresh state, contains about 71—80 per cent. of water; 15—20 of starch, 3—7 of fibre or woody matter, 3—4 of gum,

the same order, *Fusisporium Solani*, and attacks the tubers either when stored for winter or after being planted. It was very carefully investigated by Martins, and described in a memoir published in 1842. It was first observed in Germany in 1830, and caused great loss in that country throughout many years. The tissues of the P. tuber become hardened and completely filled with the mycelium of the fungus, which at last bursts forth in little cushion-shaped tufts loaded with fructification.—Wet Rot differs from Dry Rot in the tubers becoming soft and rotten instead of hard and dry, and is always characterised by the presence of a fungus referred by Fries to his genus *Periola*, but which Berkeley regards as another form or stage of the same fungus which causes or is inseparably connected with Dry Rot. Both Dry Rot and Wet Rot have often been observed along with the P. disease, which, however, is always characterised by the presence of another peculiar fungus.

But, besides its value as a culinary vegetable, the P. is important in other respects. Its starch is very easily separated, and is in large proportions; hence it is cheaper than any other kind. It is manufactured on a very large scale both in this country and on the continent. It is chiefly used in textile manufactories under the name of *farina*, which is converted into dextrine or British gum. See STARCH. In Holland and in Russia, where there is much difficulty in keeping potatoes through the winter, and there is consequently a necessity for using the crop quickly, large quantities of starch are made, and this is converted into sugar or syrup. See SUGAR. The refuse of the starch-manufactories is all economised; it is pressed out from the water, and either used for pig-feeding or for manure. In the north of Europe, much spirit for drinking is made from potatoes; it is called Potato Brandy.

POTATO DISEASE, or POTATO MURRAIN. No subject connected with Agriculture or with Botany has given rise within so short a time to so extensive a literature as this. It has been treated in books and pamphlets, and in magazines and periodicals of every kind. The terrible famines caused by the failure of the potato crop in Ireland and other countries, particularly in 1846 and 1847, concentrated upon it the attention of the whole civilised world; and yet it remains very obscure.

The potato disease seems to have been at first confounded with Dry Rot and Wet Rot (see POTATO), which appeared a number of years before it to a formidable extent, although not to be compared with it in their ravages. This fact—and all the more if the potato disease is to be ascribed to the presence of a different and peculiar fungus—may perhaps be held as giving support to the opinion that its chief cause was really the weakening of the plant through too constant cultivation on the same land, and continued propagation by tubers alone.

The potato disease was first observed in Germany, and first assumed a very serious character near Liège in 1842. In 1844 it broke out in Canada, and all at once proved very destructive. In 1845, it was first noticed in England, and first in the Isle of Wight. But during that year, its ravages were considerable in the British Islands; much more so in the year following, when the Irish famine was the consequence, and in the same year it prevailed very extensively over almost all parts of Europe. The summer was unusually cloudy and moist, a circumstance probably not without its effect. In 1847, the disease was still prevalent, but to a smaller extent; and since that time its prevalence has gradually diminished, although it occasionally breaks out in particular localities. Meanwhile, it is to

be observed, that almost all the varieties of potato cultivated to any considerable extent before 1846, have disappeared, and been replaced by others. Lost too much, however, should be inferred from this in favour of a particular theory, it must also be stated, that potatoes newly raised from seed were sometimes severely attacked by the disease during the period of its greatest prevalence.

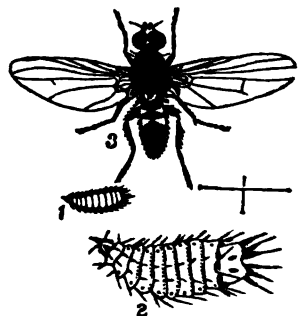
No fully satisfactory theory as to its cause or origin has been proposed. That it has long existed in the western parts of America, may probably be true, as has been alleged, although the distinction between it and other diseases of the potato might not perhaps be noted with sufficient care; but even this would not account for its sudden appearance and terrible devastations in other parts of the world. Many observers ascribed it to insects and acari, some even to infusoria in the tissues, but the presence of none of these was found to be constant, and they appeared therefore rather to be the consequences than the cause of the disease. It is otherwise with the fungus, *Botrytis infestans* (see BOTRYTIS), which is always present, although probably, like other parasites, it generally attacks an already weakened plant. The disease generally first appears in the leaves, and thence extends to the tubers, although it has been sometimes observed to appear in the tubers of some of the early kinds of which the leaves have perished before the season when it breaks out. It sometimes also lies dormant in the tubers for months, so that after being stored apparently sound in autumn, they become diseased in the following spring. When the disease appears in the growing plant, brown spots are first to be noticed on the margins of the leaves, corrugating the leaves as they spread. Very rapid extension of the disease, and decay of the leaves and stalks, often ensue. It is on the under surface of the leaf that the *Botrytis* is found; it abounds also in the diseased tubers, which, when cut, produce an abundant crop of it from the fresh surface, and it sometimes vegetates even from the natural surface. The same fungus has been found in the berries of the Tomato (q. v.) when diseased, and on the leaves of other plants of the natural order *Solanaceæ*, but never on any plant not of that order.

The starch granules which exist within the cells of potatoes seem not to be affected by the potato disease, but remain unaltered in quality, so that as good potato starch is made from unsound as from sound tubers. On occasion of the great ravages of the disease in 1846, however, advantage was but partially taken of this fact, partly from ignorance of it; partly from an apprehension, apparently quite unfounded, that the starch might prove unwholesome; and partly from the want of machinery to grate down the diseased potatoes before rottenness had involved the whole.

POTATO-FLY

(*Anthomyia tuberosa*), a dipterous insect of the same genus with the Beet-fly, Cabbage-fly, Turnip-fly, &c.

In its perfect state, it is very like the House-fly. The male is about five lines long, grayish-black, bristly, with



Potato-fly:

- 1, Larva or maggot, natural size;
- 2, larva magnified; 3, Potato-fly.

where it abounds and has been a resource in times of famine.—The name P. is said to be derived from the Latin *potens*, powerful, and to allude to medicinal virtues now known to merit little regard. *Tormentil* (q. v.) is sometimes referred to this genus.

POTENZA (anc. *Potentia*), in South Italy, the chief town of the province of Basilicata, is situated on a hill of the Apennines, near the river Vaseuto or Basento, 54 miles east of Salerno. Pop. 12,789. It is surrounded by a wall, has a fine cathedral of the Doric order, and is the seat of an archbishop. P. was shaken by earthquakes in 1273, 1694, and 1812. The province of Basilicata is that which suffers most from brigandage, because of the hills and woods which surround it.

POT-HERBS are not, as might be supposed from the name, the vegetables chiefly used for culinary purposes as supplying articles of food, but rather those which are of secondary importance, and valuable chiefly for flavouring, as parsley, fennel, &c.

POT-METAL is an alloy of lead and copper, obtained by throwing lumps of copper into red-hot melted lead. It is of a gray colour, brittle and granular.

POTO'MAC, a river of the United States, formed by two branches, which rise in the Alleghany Mountains, and unite 20 miles south-east of Cumberland, Maryland, from which point the river flows in a generally south-easterly course, 400 miles, and falls into Chesapeake Bay, where it is 6 to 8 miles broad, 75 miles from the ocean. Line-of-battle ships ascend to Washington, 120 miles from its mouth, and the tide reaches Georgetown. Between Westport and Washington, 220 miles, it falls 1160 feet. The scenery in this portion of its course is wild and beautiful, especially where it breaks through the Blue Ridge at Harper's Ferry. Its principal affluents are the Shenandoah, Savage, Monacacy, and Acquia Creek. The P. forms the greater part of the boundary between Virginia and Maryland. During the war which began in 1861, both Federal and Confederate armies crossed several times the fords of the Upper Potomac, and severe actions were fought upon its banks.

POTOROO, or **KANGAROO RAT** (*Hypsiprinus*), a genus of marsupial quadrupeds, of the family *Macropidae* (see **KANGAROO**), differing from kangaroos chiefly in having distinct canine teeth in the upper jaw. The first pair of incisors in the upper jaw are also longer and larger than the others. The molars decrease in size backwards; and when not worn, present four blunt tubercles. The forelimbs are proportionally longer, the hinder-limbs less powerful than in the kangaroos. The general form and habits are similar; there is the same sitting on the hind-feet with help of the tail for support, and a somewhat similar hopping, but not nearly an equal power of vigorous leaping. The stomach is large, and divided into two sacs, with several inflations; the food entirely vegetable. There are several species, all of small size, none of them larger than a rabbit, and all natives of Australia, timid and harmless creatures. They are generally clothed with a dense, and sometimes a beautiful fur; but the tail is nearly destitute of hairs, and scaly.

POTO'SI, one of the richest mining-towns of South America, the second town of Bolivia, and capital of a department of the same name, stands in a dreary and barren district, 13,330 feet above sea-level, in lat. 19° 35' S., and long. 65° 25' W., 70 miles south-west of Chuquisaca. It covers a large area, and in 1611, its population was 170,000, but

in 1853, it had fallen to 22,850, and great part of the town was in ruins. In its centre is a large square, around which are ranged the principal public edifices, as the government-house, town-house, cathedral, &c. The mint is a large building, in which the average amount now coined amounts to about 2,000,000 dollars annually. In the central square, an obelisk in honour of Bolivar was erected in 1825. English and French manufactures are imported; and as the country in the vicinity produces little or nothing, all supplies have to be brought from a distance. The Cerro (sierra) de Potosi, or Silver Mountain, is 15,200 feet high. Its summit is honey-combed with upwards of 5000 mines, and operations are now carried on at a lower level, where the inrush of water, however, often compels the miners to abandon the richest mines. Up to the year 1846, the quantity of silver extracted from the mines of this mountain amounted to £330,544,311.—Bollaert's *Antiquities of South America*.

POT-POURRI, in French, the name of a mixture of sweet scented materials, chiefly flowers, dried, and usually placed in a vase with a perforated lid, in order that their perfume may be diffused through rooms in which it is placed. The principal ingredients are rose-petals, lavender flowers and stalks, violets, jessamine flowers, woodruff leaves, cloves, orris-root, pimento, musk, sandal-wood raspings, cedar-shavings, &c. But it also signifies a dish of different sorts of viands, and corresponds, in this sense to the *hotch-potch* of Scotland, and the *Olla Podrida* (q. v.) of Spain.

POT-POURRI, in Music, a selection of favourite pieces strung together without much arrangement, so as to form a sort of medley.

POTSDAM, the capital of the Prussian province of Brandenburg, and, next to Berlin, the handsomest and best built town in Prussia, is situated on an island at the point of junction between the small stream of the Nuthe and the river Havel, 16 miles south-west of Berlin. Population at the close of 1861, 34,869, with 6955 military. P. is divided into the Old and New Town, and is surrounded by ramparts with nine gates, from which seven bridges over the Havel and the canal lead to the suburbs. The streets are broad and regularly built, and there are fine squares, some of which are planted with trees, forming pleasant public walks. Of the many large and handsome buildings, one of the most worthy of notice is the old royal palace, an oblong parallelogram, three stories high, with a magnificent colonnade facing the fine Havel Bridge. P. has several benevolent and educational institutions connected with the state, as, for instance, two asylums for the orphan children of military men, and one for those of persons belonging to the civil service; schools for cadets, subalterns, and privates; the Luisendenkmal, an institution for providing for indigent girls of irreproachable character; a gymnasium, a high-school, and various other training and special schools. Among the churches, the most noteworthy are the Garnisonskirche, with a tower 400 feet high, a fine chime of bells, and a noble marble pulpit, below which rest the remains of Friedrich-Wilhelm I. and Friedrich II., and St Nicolai's, lately rebuilt after the model of the Pantheon at Paris. The Brandenburger-Thor, which is the handsomest of the various gates, is a triumphal arch copied from Trajan's Arch at Rome; and this, like the other gates, opens upon a fine allée of trees. P. is surrounded with pleasant public walks and gardens, wooded heights, and vine-covered banks; while in the immediate neighbourhood are numerous

painted between 1652 and 1654, when he died. He executed some admirable etchings.

POTTER'S CLAY or FIGULINE, a kind of Clay (q. v.); either slaty and massive, or more generally, earthy; yellow, yellowish-white, gray, or sometimes greenish; adhering strongly to the tongue, and forming a paste with water. The earthy variety is sometimes very loose, sometimes almost solid. P. C. is a mineral of very common occurrence in alluvial districts, and sometimes occurs in beds of considerable thickness. It occurs in many parts of Britain. It is used in potteries for the manufacture of earthenware; the different varieties of it being adapted to different kinds of earthenware. Houses are built in Egypt of pots of this material.—P. C. is also employed in agriculture for the improvement of light sandy and calcareous soils.

POTTERY. This term—supposed to be derived from *poterion*, the drinking-cup of the Greeks, and transmitted by the French word *poterie*—is applied to all objects of baked clay. The invention of pottery dates from the most remote period, and its application is almost universal—objects of pottery being in use amongst races even semi-barbarous. The art of moulding or fashioning vessels of moist clay, and subsequently drying them in the sun, is so obvious, that it is not above the intelligence of the rudest savage. Hence, at the most remote antiquity, the Egyptians, to whom precedence must be assigned in this art, made bricks of unbaked or sun-dried clay, cemented with straw, which were quite sufficient for the purposes of construction in a country where little or no rain falls. These bricks, in shape resembling those in use at the present day, but of larger dimensions, were impressed, at the



Fig. 1.—Unglazed Egyptian Bottle in the British Museum.

earliest period, with the marks of the brick-maker, and later, with the names and titles of the kings for whose constructions they were made. The oppression of the Hebrews chiefly consisted in compelling them to work in the brick-fields—a task imposed on captives taken in war and reduced to slavery; and the fortresses of Pithom and Rameses, on the Egyptian frontiers, were made of bricks by the Hebrews. Kiln-dried bricks, in fact, did not come into use in Egypt till the Roman dominion, although some exceptional objects of the class of bricks have been found, such as a kind of conical plug, stamped on the base with the names of the tenants of



Fig. 2.—Glazed Egyptian Vases in the British Museum.

the tombs. A few other objects were made in unbaked clay; but vases of baked earthenware were in use at the earliest period of Egyptian civilisation, and are contemporary with the

Pyramids themselves. The Egyptians made a red ware, a pale-red or yellow ware, and a lustrous or polished red ware—the two first being used for vases destined for culinary and other purposes, the last for vases of more refined use, such as holding perfumes, wine, honey, and other delicacies. But the most remarkable Egyptian pottery was the so-called porcelain, made of a fine sand or frit loosely fused together, and covered with a thick silicious glaze of a blue, green, white, purple, or yellow colour. This celebrated ware, the porcelain of the old world, sometimes exhibits the most beautiful tints of blue, a colour which was produced by an oxide of copper, and which is still unrivalled. Objects were made of this material for the decoration of the dead and for the toilet. They were exported from Egypt to the neighbouring countries, and are found alike in the tombs of the Greek isles, the sepulchres of Etruria, and the graves of Greece. Most of the figures of deities, the sepulchral ones deposited with the dead, a few elegant vases, portions of inlaying, objects of the toilet, and beads and other decorations, are made of this porcelain. Still finer work of this kind was produced by carving scarabei and other small objects in steatite, and covering them with a blue glaze, so as to combine brilliancy of colour with delicacy of execution. The Egyptians had at the earliest period the simpler manipulations and tools of pottery—the potter's lathe or wheel, moulds for stamping objects, and various other tools. On the decadence of the country under the Greeks and Romans, the pottery became assimilated to the Greek and Roman.

In the contemporary empires of Assyria and Babylon, pottery was also in use at an early period. Sun-dried and kiln-dried bricks were made in the reigns of Uruk and other monarchs of the oldest Babylonian dynasties, about 2000 a. c. Platforms for elevating the larger edifices were made of them; and the bricks, like the Egyptian, were stamped with the names and titles of the monarch, to which was added the locality for which they were destined. Glazed bricks of various colours, occasionally enriched with scenes and ornamental designs, were introduced into constructions; and Semiramis is said to have adorned with them the walls of Babylon. The Assyrians and Babylonians employed this material for historical and legal purposes, making cylinders, hexagonal prisms, and purse-shaped objects of it, on which were impressed extensive writings. One of these remarkable objects contains the account of the campaign of Sennacherib against Judea and the tributaries of Hezekiah. The Assyrian and Babylonian pottery resembles, but is not entirely the same as the Egyptian, being of a pale red ware, of thinner substance, finer paste, and more refined shape. At a later period, figures of deities were modelled in terra cotta. The glazed ware of Babylon and Assyria is coarser than the finest Egyptian, and is the earliest example of the employment of materials for colouring like those now in use; the glaze, however, is silicious. The objects most remarkable for size are the large coffins found at Warka, supposed by some to be the Ur of the Chaldees, with oval covers, and ornaments of the Sassanian period. The potteries of Mesopotamia continued to flourish under the Parthian and Sassanian monarchs till the conquest of Asia by the Mohammedans.

The potter's art is mentioned in the Scriptures, but few specimens of Hebrew wares have been found. Some vases have been exhumed in Phœnicia. The most remarkable pottery of antiquity was the Greek, which seems to have had another origin than the oriental. The terms *keramos* and *ostrakon* were applied by them to this material, and

later poets. Vases of this description are found in Greece, the isles of the Archipelago, and Italy; into which latter country they appear to have been imported from Greece.

In Italy, indeed, the Etruscans, at an early period, and perhaps some of the principal cities in Magna Græcia, manufactured their own pottery. That of the Etruscans consists principally of three kinds—an unglazed red ware; a lustrous brown ware, made also by the neighbouring Sabines and Oscans; and a black ware, the paste or substance of which is black throughout, not superficial, as amongst the Greeks, and made by mixing some colouring material with the clay. The Etruscan pottery is rarely painted—the black ware never—but it is distinguished by having ornaments in salient and bas-relief modelled or moulded on it, and by the shapes of the vases apparently being derived from works in metal, and reproducing the fantastic combinations of oriental art. This ware, which was in use from 600 to 320 B. C., was the source from which subsequently arose the Aretine and Roman pottery. It was ornamented sometimes with incised ornaments; the subjects, however, are generally uninteresting, and it never attained a high position in art. The Etruscans, however, in later times imitated the painted vases of Greece, but their clay is much paler, the drawing coarser, and the shapes less elegant. In terra cotta statues, they particularly excelled, and supplied the Romans with the figures of their divinities. Even sarcophagi were made of this material.

On the decline of the pottery of the Greeks and Etruscans, a new kind of ware was made at Arezzo, or Arretium, to which has been given the name of Aretine, and which resembled the later ware of the Greeks. It is evidently imitated from works in metal, in all probability from the chased cups of silver and gold which began to come into use in Italy, and was a continuation of the later moulded wares of Greece and Italy. The vases were of a bright red or black colour; the paste, uniform in colour throughout, but covered with a lustrous silicious glaze. The red colour nearly resembles in colour and texture a coarse sealing-wax, the paste is often remarkably fine. The vases, generally of small dimension, were turned on the lathe; the ornaments were moulded separately, and attached to the vase: patterns were produced by the repetition of the same mould, or by placing bas-reliefs from various moulds on the vases. This kind of pottery was first made at Arezzo, but subsequently, or nearly simultaneously, was produced at Capua and Cumæ in the 1st c. A. D. It afterwards extended over all the Roman world, and was made in Gaul and Germany. It was called Samian ware under the republic, and was at first extremely fine, but deteriorated under the last of the twelve Cæsars, and is no longer found under the Antonines; a red ware, glazed with red-lead and copper, having been substituted for it. The names of several hundred potters are found stamped upon extant specimens of this ware, and some of them are evidently of Gaulish or British origin. These names are followed by *F.*, *fecit*, or made; *M.*, *manu*, or by the hand of; and *OF.*, *officina*, or establishment. The ware was extensively imported into Britain and the remoter provinces of the empire; and wherever found, shews the influence of Roman civilisation. Furnaces for it have been found in France and Germany, but not in England. The other kinds of Roman ware were local, evidently made upon the spots where found, but with inferior ornamentation. Black-ware seems to have succeeded this, and to have been produced by confining the smoke of the furnace, and throwing it down upon the heated ware. In

Britain, varieties of this ware were made at Castor in Northamptonshire, ornamented with bas-relief, laid on by the process of depositing a fluid clay on the wet ware, and moulding it with a tool. The style of art is Gaulish. Other vases of glazed ware



Fig. 5.—Anglo Roman Vase [Castor].



Fig. 6.—Roman Vase.

were manufactured at Upchurch near Rochester, and at Crockhill in the New Forest. They have only a few ornaments, either stamped or painted in a white pipeclay on the surface. These vases are probably as late as the 3d c. A. D. Later, arose a black-ware, generally bottles or jugs, glazed externally, and with single words, invitations to

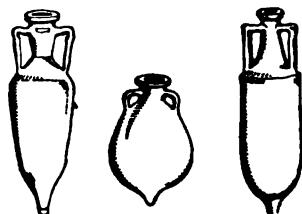


Fig. 7.—Roman Amphora.

drinking, painted on them, in a white pipeclay. Many varieties of unglazed ware, red, yellow, white, and gray, were extant in the 2d and 3d centuries. The large culinary and other vessels were made of these—such as casks (*dolia*), amphoræ, jugs (*lagenæ*), and mortars (*mortaria*)—the last at Lyon. The Romans made great use of brickwork terra cotta. All over the empire, bricks were made for public and private buildings, and stamped at Rome with the name of the proprietors of the land, the potters, and the consulate of the period. till the middle of the 3d c. A. D. Bricks were also



Fig. 8.—Roman Flange Tile.



Fig. 9.—Roman Flue Tile.

extensively manufactured by the legionaries, and bear their names and titles. The graves of the

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soldiery were often constructed of them. At Rome, the last inscribed bricks are those of Theodoric; none so late have been found in Britain or Gaul. Tiles, cornices, roof-ornaments, and gutters were formed of terra cotta, so were the votive figures offered to the gods; but they all disappeared at the invasion of the northern barbarians, although they continued till then to be manufactured by local potteries.

Among the northern nations, especially the Celts and Scandinavians, long prior to the Roman conquests of Gaul and Britain, at the remote age of the Stone and Bronze Periods, large and small vases, perhaps originally employed for domestic, but subsequently for mortuary purposes, are found amongst the cromlechs, the tumuli, and graves of Northern Europe. They are formed of a coarse clay, mixed with small pebbles, and have been feebly baked by surrounding them with hay, dried ferns, or other combustible vegetable matters, which have been burned inside and around them. The interior of the walls are black; the exterior, of a pale brown colour. Their mouths are large, the ornaments, hatchings, and rude line sometimes making an elaborate pattern or tattooing all over the vase. Those from Britain were called *bascuades*, or baskets, by the Romans. A modification of this class of ware was continued under the Saxons and Merovingians, and is distinct from the Gallo-Roman and Romano-British potteries: the clay being better baked, and the ornaments, stamped or impressed from a mould, more regular. The use of pottery among these races was to a great extent superseded by glass, metal, and other substances for drinking and culinary vessels, and few or no specimens of medieval unglazed vessels are known. Terra cotta, indeed, continued to be applied for making figures from the 14th to the 18th c. in Europe; but in England, even the use of bricks, a manufacture difficult to have been lost, was restored by Alfred. Unglazed ware was, in fact, superseded or abandoned in Europe after the fall of the Roman empire; but in modern times, the use of terra cotta and such like ware is found extended all over Europe, Asia, and Africa, varying in texture and excellence from the coarse flower-pots to the thin and graceful water-bottles of the Arabs and modern Egyptians. Even the Nigritic races continue to manufacture a feebly baked earthenware, rudely coloured with pigments not baked on the ware. In the New World, the existence of unglazed earthenware seems to date from the most remote antiquity. The vases and other objects found in the northern portions of America, indeed, are of the rudest kind, and bear a striking resemblance to those of the early Scandinavian, Celtic, and Teutonic graves, in paste, shape, and ornamentation. The Mexican and Peruvian potteries, however, evince a much greater mastery of the art, and both are modelled with great spirit, gaily coloured, and profusely ornamented. Some of the oldest Peruvian wares, indeed, rival in their modelling European art; but they never attain to glazing. The other unglazed wares of the New World differ according to the localities where they have been manufactured, and in the most highly-civilised portions, reflect or rival the arts of the people by which it has been colonised. Those of the existing native races are very feeble, and the processes are sometimes accompanied by magic ceremonies. The pottery of the southern hemisphere is quite recent, as none of the races seem to have been acquainted with the art. The Fijis, indeed, have a ware glazed with the resin of a tree, but it appears to have been derived from Europe.

The knowledge of glasses originally acquired by the Egyptians and Assyrians, was continued under

the Roman empire at Alexandria, and appears to have been transmitted to the Persians, Moors, and Arabs. Fayences, and enamelled bricks and plaques, were in use among them in the 12th c., and among the Hindus in the 14th c. A.D. The Moors introduced into Spain the use of glazed tiles about 711 A.D., examples of which, called *azulejos*, as old as the 13th c., are found in the Alhambra. Besides these, the manufacture of glazed or enamelled fayences in Spain, distinguished by a metallic iridescence, came into use from the 13th c. in Spain. In Italy, they are supposed to have been introduced as early as the conquest of Majorca by the Pisans, 1118 A.D.; but the first appearance of Italian enamelled fayence, the precursor of modern porcelain, does not date earlier than about 1420, when it was used for subjects in relief by Lucca della Robbia. About a century later, plates and other ware were manufactured at Pisaro and Gubbio, decorated with subjects derived from the compositions of Raphael and Marc Antonio, painted in gay and brilliant colours. But the establishment was abandoned in 1574, although pieces of *majolica* continued to be fabricated in various cities of Italy till the 18th century. From Italy, this enamelled ware passed into France in 1590 with Catharine de' Medici, where it was manufactured till the end of the 17th century. In 1555, the celebrated Palissy discovered at Saintes the art of glazing or enamelling a gray paste, and introduced dishes and other objects with fruit, fish, and animals moulded from life, distributed over the surface, as a kind of ornamental ware. At the same time, or earlier,

Fig. 10.—Vase of Henry II. ware.

was made what is called Henry II. ware, and which is now so precious, consisting of glazed white ornamental pieces. Glazed or Norman tiles, however, as they are called, date from two centuries before. At the close of the 13th c., glazed ware was made in Alsace; but it was not till two centuries later that *majolica* was fabricated at Nuremberg; and the manufacture was continued in various parts of Germany till the 18th century. Delft, which gave its name to its own fabric, is said to have produced a glazed ware as early as 1360, and continued to do so till the 19th century.

Holland was chiefly celebrated for its bottles of stoneware, glazed by salt, called *Bellarmines*, *Graybeards*, or *Bonifaces*, and for its tankards, which were imported all over Europe, in the 16th c.,

and are repeatedly found in London excavations. In England, glazed tiles for religious purposes



Fig. 11.—Tyg with two handles, 14th century.

were made by the monastic orders from the 12th to the 16th centuries; and glazed bottles, jugs, and cups are found of the time of Henry II.; while Edward III. favoured the establishment of potteries in England. The English wares, however, were superseded by Delft and Dutch stonewares till the close of the 17th c., when the coarse wares made at Burslem were improved by the discovery of salt and other glazes. Some Germans, named Elers, from Nuremberg, settled there, and produced an improved ware called the red Japanese; but finding that the secret was discovered by Astbury, left for Lambeth, where they established themselves in 1710. From this period, various improvements were introduced by Astbury, Booth, and finally by Wedgwood, who discovered more suitable clays in 1758, and called to his assistance the arts of

3000 furnaces were in activity, and where the manufacture is still carried on. There are about 19 renowned potteries in the empire. The art of pottery in China is said to be as old as 2599 a.c. In Japan, hard porcelain dates from 27 a.c.; translucent porcelain was made about 672 a.d.; but between 1211 and 1221, Kotosiro, a Japanese potter, went to China to improve his process. There are 18 celebrated potteries in Japan; and in modern times, the pieces exported come chiefly from Imari, in the province of Fizen. In 1644, the Dutch exported 44,943 pieces from Japan. At the beginning of the 16th c., the porcelain of China began to be extensively imported into Europe, and various unsuccessful attempts were made to discover the secret of its manufacture, but without success, both as to the material and the process. The Persians, indeed, are said to have produced translucent pottery about the 15th c. a.d.

After some trials, which resulted either in the production of a kind of opaque glass or stoneware, Böttcher or Böttger, an alchemist (who had been seized by Frederick Augustus II. in 1701), after Schnorr, in 1709, had discovered white kaolin at Aue, produced from it a white hard porcelain at Meissen, near Dresden; and the porcelain establishment there was founded under royal auspices. Extraordinary precautions were taken to prevent the process being discovered, by imposing oaths upon the workmen, and the process there pursued was not communicated till 1812 to Brongniart. The secret, however, was betrayed by Stöfel, a workman of Meissen, who fled to Vienna in 1720, where an imperial establishment was founded, which exists to this day. Other workmen carried the secret from those establishments all over Germany. Royal works were set up at Berlin in 1755, at St Petersburg in 1744, and at Munich in 1758. From this period, two different kinds of porcelain were made in Europe, a soft and a hard. In France,

soft porcelain was made at St Cloud in 1695, and was not discontinued till 1804. The accidental discovery, by Madame Darnet, of kaolin at St Yrieix la Perche, in 1765, led to the production of hard porcelain at Sèvres, where, after 1800, only this kind was made. Various places in France made both kinds; and in Italy, both were produced at La Doccia, near Florence, at Capo di Monte, near Naples, and at Venice. Other establishments flourish at Madrid and Oporto, established in the 18th century. The manufacture of soft porcelain appears to have been introduced in England, at Bow, as early as the 17th c., and the Chelsea works were set up still earlier, according to some, by Elers. Thence the art was transferred to Derby in 1748; and an establishment

Fig. 12.—Tyg of Staffordshire ware.

design, by the employment of Flaxman for bas-reliefs and figures. The applications of copper-plate printing and gilding were subsequently discovered. Still later, other materials, as felspar and bones, were used in the composition of this pottery. Delft-stone and other wares were made at different places, as Liverpool, Lowestoft, and elsewhere; but, after different vicissitudes, most of the potteries have disappeared except those of the stoneware at Lambeth and Vauxhall.

None of this ware, however, was of the nature of the Chinese porcelain which had been imported by the Arabs in the 13th c., was known in Italy in 1330, and was imported into France as early as 1370, and into England much later. The name porcelain, from *porcellana*, an obscure Portuguese word, supposed to mean a shell, is applied to a mixture of alumina or kaolin and siliceous matter, which, when baked, does not fuse at a temperature as high as 140° of Wedgwood's pyrometer, and the glaze of which is incapable of being scratched by a knife. This porcelain, called 'hard porcelain,' is said to have been invented at Sin-ping in China, about 185 a.c., and rose to great importance at King-te-chin, 557 a.d., where, in 1712,

Fig. 13.—Staffordshire Minster.

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different manufacturers in this and other countries. Pottery and porcelain differ chiefly in this, that the superior quality of the materials used in making the latter, gives it a peculiar translucency. For pottery, inferior materials are used, and a considerable admixture of calcined flint, bone-ashes, or native phosphate of lime, are added to the clay. The use of the calcined flint was said to have been first adopted by a Burslem potter named Astbury, who, whilst travelling to London on horseback, in the year 1720, had occasion, in passing through Dunstable, to seek the assistance of an hostler, in consequence of some disease in his horse's eyes. He noticed that the man took a piece of flint, burned it, and then reduced it to a fine powder, which he blew into the horse's eyes. Astbury noticing the beautiful whiteness of the powder, conceived the idea of using it in his pottery; and did so with great success.

The ingredients, such as the clay and calcined flints, are ground by separate means; the former in

the pug-mill, which is represented in fig. 14. This is an upright, iron-bound, wooden cylinder, with an axis *A* turned by machinery; projecting from *A* are seven arms, *b*, each of which has three knives fixed in it, with the points outward, and so arranged that they spread over the largest amount of space in the interior; and altogether they are placed in a spiral manner, so that when in motion,

Fig. 14.

the clay, which is thrown in lumps into the hopper-shaped upper part of the vat, is worked down, and is so cut and kneaded by the knives, that it is forced out at an opening at *C*, in the state of soft pap. This is aided by the knives on the lower part of the lowest arm being connected together by a plate *D*, which prevents all settlement at the bottom. This pap-like clay passes into a large wooden tank, in which it is agitated with water until quite incorporated, so as to resemble milk in colour and consistency. In another mill (fig. 15), of a different construction,

Fig. 15.

the Cornish granite and calcined flints are being reduced to a somewhat similar state. This mill is very strongly constructed, and consists of a tub-like vat *A*, in the centre of which turns an axle *B*,

moved by machinery; in the bottom of the vat is a thick stone-bed *C*, consisting either of chert or horn stone. From the upper part of the axle, three strong arms, *D*, *D*, *D*, project like the spokes of a wheel; and strongly attached to these are stout beams, *a*, pointing downward, and nearly touching the stone-bed *C*. As the axle, with its arms and beams, turns round, the beams push some large masses of the Cornish granite or of chert stone round with them, and these triturate the calcined flints and other hard materials, and stir up the water with which the vat is kept constantly supplied, whilst it overflows in a milky state, charged with the finely-divided materials, into a cistern, where it is kept stirred until it is sufficiently supplied with the solid materials, and the thickened milky liquid is then drawn off, in proper proportions, into a vat to which the prepared clay is also passed. The mixture of the two is then allowed to subside until the water is nearly clear, when it is drawn off; and the sediment is deprived of its surplus moisture, either by evaporation, or, in the best works, by a pneumatic-exhausting apparatus, which does it very quickly. The composition is then a fine plastic material of the consistency of tough dough, and is ready for the potter's use. In preparing the finer materials for porcelain, many other operations are required, all, however, having the same object, viz., the extremely minute division of the substances used.

The prepared clay is taken to the throwing-machine, or potter's lathe, which is represented in fig. 16. This consists of a fixed table *A*, through

D

Fig. 16.

which passes the axle *B*, and rises a little above its surface, and having on its upper end a disc *C*, which revolves with it. The axle is put into rapid motion by turning the fly-wheel *D*, either by hand or machinery; and this causes a rapid revolution of the disc *C*, upon which is placed the soft mass of clay to be moulded. At *E* is seen an upright, with a small sliding-bar regulated by a screw; this is the guide for the potter to regulate the height of the vessel he is making. When the lump of clay is revolving, the potter, with his hands or with proper tools, fashions it into any shape he pleases; his management of this requires considerable skill, as nearly every article requires a different configuration. But some articles are formed in moulds, the moulds being made of plaster of Paris. This answers well for fine porcelain

Fig. 17.

intended to be very thin, because the plaster-mould absorbs much of the moisture in the paste, and thus partially dries

another to a great height in the kiln, as seen in fig. 24, in which some of the seggars are seen in section, for the purpose of making the arrangement more intelligible. As the seggars are generally made large enough to hold a number of articles, which would, when highly heated, adhere if they touched, a number of curiously shaped pieces of



Fig. 25.

burned clay are used for placing between them, so as to make them rest on points; these are called *wickets, cockpurs, triangles, stills, &c.*, fig. 25. In



Fig. 26.

the seggar, filled with plates (fig. 26), the plates are seen each resting on *cockpurs*, which prevent them touching. Another object is gained by this, in burning flat articles such as plates; these, if placed one upon another, would not be fired equally, but when they are held apart, the heat affects all parts alike. The seggars are so piled in the kiln that the centre is hollow, and there are free spaces between them through which the fire can ascend; props, *a, a, a*, fig. 24, being so placed as to keep them from immediate contact with the sides all round. Thus, each seggar forms a small oven, in which one or more pieces of pottery or porcelain are baked, and the seggars prevent any unequal heating of the pieces, and also protect them from smoke. A kiln has generally eight furnaces, and it is usual to raise six piles of seggars between every two furnaces, or rather between their flues, which rise to a considerable height in the kilns. Each pile of seggars is technically called a *bung*, so that there are generally 48 or 50 bungs to the charge of a kiln. When all this is arranged, the furnaces are lighted, and great care is taken to have the best coal, as it enables the manufacturer to make a more certain calculation as to its effects, and is less liable to smoke and sulphurous vapours, which might injuriously affect the contents of the kiln. The baking or firing requires great care and attention, and there are many nice regulations connected with it to guide the workman. It usually lasts from 40 to 42 hours. The fire is then allowed to go out, and the kiln to cool very gradually, after which it is opened, and the seggars removed, to be unpacked in a separate workshop. The articles are now in the state called *biscuit-ware*, and require both the glaze and any patterns they may be intended to bear. Common pottery is often figured by printing the design in enamel colours on paper, and whilst the printing is still wet, applying it to the biscuit-ware; the ware absorbs the enamel ink, and the paper is removed by water, leaving the pattern on the ware. It is then fired in seggars, or a muffle, to fix the colour, and is then dipped into composition called *glaze*, of which three kinds are used in the Staffordshire potteries. The first, for common pipeclay ware, is composed of Cornish granite, 16 parts; flint, 36 parts; white-lead, 53 parts; and cullet, or broken flint-glass, 4 parts. These materials are

tritulated with water, with the same care and by similar means to those employed in forming paste, and are reduced with water to the same milk-like liquidity. Each workman has a tub of the glaze before him; and as the articles of biscuit-ware, either with or without decorations, are brought to him, he dips them in the glaze, so as to insure a uniform coating over them; and by nice management, he prevents any large drops or accumulations on one part more than another. The porous biscuit-ware rapidly absorbs the moisture, and dries up the thin film of glaze on the surface of the articles, which are again placed in seggars, and carried to the glaze-kiln, where they undergo another firing, which melts the glaze, and converts it into a perfectly transparent glass, like water, all over the surface, and renders any pattern previously printed upon it very plain. The temperature in the glaze or enamel kiln is only increased very gradually, and is kept up for about 14 hours, after which it is allowed to cool slowly, and the articles are taken out completed. So far, this description has applied to the manufacture of pottery and porcelain on a large scale, for general purposes; but when it is applied to more costly and artistic works, very special arrangements are required; and in the case of remarkably fine pieces, instead of the huge kilns, which hold frequently many thousand pieces, muffle furnaces (fig. 27) are both used for the

Fig. 27.

biscuit, the glaze, and the coloured and gilded decorations, which, in porcelain, are applied on the glaze, and not on the biscuit.

The decoration of porcelain has long held a high rank as a fine art; and the exquisite skill shown in some of the finest works of the continental manufactures, and lately in those of Britain, has fairly entitled it to that rank. The colours employed are all coloured glasses ground to impalpable powders, and mixed with borax or some other fluxing material; for use, they are generally made liquid with oil of spike, and they are laid on with hair-pencils, in the same way as oil-colours. The whole process is exactly the same as in painting or staining glass; the glaze on the biscuit-porcelain being true glass, and the enamel colours being exactly the same as those used by the glass decorator. The colours may be made by mixing the materials of which glass is made with the colouring material and the flux, or simply with the already coloured glass and the flux. When the former plan is employed, the following

are
chro:
violet
uran
brown
gray
of tr
subo
for f
chro:
for y
purp

Several of these colours are much increased in brilliancy by the addition of oxide of zinc, which of itself gives no colour; and the transparent ones are rendered opaque by the addition of oxide of tin.

Other fluxes besides borax, or borate of soda, are used—as sand, felspar, boracic acid, minium or litharge, salt, saltpetre, potash, and soda. Nothing enriches the appearance of porcelain more than good gilding; for this purpose, gold-leaf is rubbed down with oil of turpentine; or pulverulent gold is produced by precipitating a solution of gold in aqua-regia, by the addition of a solution of sulphate of iron. The gold is precipitated as a brown powder, which is washed and dried, and then worked up with one-sixteenth of its weight of oxide of bismuth

—At Sevres, kaolin, 48 parts; sand (pure white), 48 parts; chalk, 4 parts. At Dresden, kaolin, 62 parts; felspar, 26 parts; broken biscuit-porcelain, 2 parts. At Berlin, kaolin, 76 parts; felspar, 24 parts. In England, three mixtures are used—For common china, ground flints, 75 parts; calcined bones, 180 parts; china-clay, 40 parts; clay, 70 parts. For fine china, ground flints, 66 parts; calcined bones, 100 parts; china-clay, 86 parts; Cornish granite, 80 parts. Fine, for modelling figures, &c., Lynn sand, 150 parts; calcined bones, 300 parts; china-clay, 100 parts; potash, 107 parts. The glazes require to be varied for nearly all, so that their fusibility may be greater or less, according to the more or less fusible character of the biscuit



1, Pennington, Liverpool, 1760—1780; 2, Plymouth, about 1760; 3, Richard Champion, Bristol, 1772—1790; 4, Charles Green, Leeds, 1790; 5, Bow, 1730—1790; 6, Absolon, Yarmouth, about 1790; 7, Chelsea, 1730—1764; 8, Swansea, Wales, 1790; 9, Worcester, 1760—1780; 10, Yarmouth, about 1790; 11, Derby, 1751—1769; 12, Crown, Derby, 1780—1830; 13, Shropshire, 1772—1799; 14, Cookworthy, Plymouth, 1760; 15, Derby—Chelsea, 1770.

ingredients. 2. *Parian*.—The composition for this is the same as that for the fine English china, but it is used in a liquid state, so as to be poured into the plaster of Paris moulds. It requires very great care in the firing. 3. *Earthenware* (Fr. *Faïence*,

from *Fayence*, the name of a place in Italy where it was made; Dutch, *Delft*, from its having been chiefly made at Delft, in Holland).—Made of various kinds of clay, varying in colour from yellow to white, according to the quality required; and

more or less of powdered calcined flints are mixed with it, to give it body and hardness. Sometimes, as in porous vessels, only clay is used. 4. *Stoneware*, such as is used for jars, bottles, drain-pipes, &c., is made of several kinds of plastic clay, mixed with felspar and sand, and occasionally a little lime, but the materials vary much in different localities.

In this country, the potteries not only supply the demand, but are estimated to export about £1,300,000 annually. The entire produce in 1851 was £2,450,000. In 1852, there were 185 establishments; 70,000 operatives were employed, and 84,000,000 pieces exported. England, France, and Germany only export; England to the greatest amount. France, which had only five or six establishments, did not produce more than £200,000 worth annually, and exported £18,000 worth. Germany, which had 40 manufactories, exported about 5000 tons. The chief exports are to North America, where, however, in the various states there are rising potteries, as Jersey, Philadelphia, Liverpool in Ohio, and other places.

Most of the celebrated manufacturers of pottery and porcelain, both at home and abroad, have employed a special mark to distinguish their works, and these are now of considerable importance in enabling us to ascertain the origin of choice specimens. On the preceding page are given some of the more important marks and monograms, so used by the earlier English makers, when their names in full were not imprinted, as was often the case.

POTTO. See KINKAJOU.

POTTSVILLE, a village of Pennsylvania, on the Schuylkill River, at the entrance of Norwegian Creek, 93 miles north-west of Philadelphia, with which it is connected by railway. It is in the midst of a rich anthracite coal and iron region, and has four iron foundries, a brass foundry, manufactures of iron safes, sashes, and wood-work; county buildings; 3 English, 3 German, and 1 Welsh paper; and 16 churches, 3 of which are Welsh. Pop. in 1860, 9444.

POTY', a district town, and rising seaport of Russia, in the Caucasian government of Kutais, stands at the mouth of the river Rion, on the eastern shore of the Black Sea. The Rion connects the port with the interior, and since the establishment of regular steam communication by the Russian Trade and Navigation Company in this quarter, the commerce and especially the transit-trade of this town has greatly increased. The number of inhabitants is small, but is increasing.

POUCH, MILITARY, a stout leather box, black or brown, lined with tin, covered with a strong flap, and ornamented with the device of the regiment, serves to carry the cartridges required by a soldier for immediate use. When cartridges are supplied for a whole day's service, two pouches are worn, one on the front point of the hip, and a larger one on a belt suspended over the left shoulder.

POUCHED RAT (*Pseudostoma*), a genus of *Murida*, of which there are several species, natives of parts of North America west of the Mississippi, and some of them very troublesome from the ravages they commit in fields and gardens. They have four molars on each side in each jaw. The tail is short. The cheeks are furnished with pouches, to which the name refers, the openings of which are from the outside, and not from the mouth. The pouched rats burrow in the ground, and do great mischief to root-crops.

POUGHKEEPSIE, a city of New York, U.S., on the east bank of the Hudson River, 75 miles north of New York, finely situated on a table-land,

about 200 feet above the river. The city has broad and handsome streets, with fine public and private edifices. The collegiate school is situated on an eminence which rises 500 feet above the river, and from which a magnificent prospect, embracing an area 2500 square miles in extent, may be obtained. P. contains a city-hall, academy, law-school, lyceum, orphan asylum, 6 public schools, an endowed female college, a rural cemetery, 4 banks, extensive iron-works; carriage, chair, and carpet factories; breweries, 21 churches, and has railway and steam-boat communication with New York and Albany. P. was settled by the Dutch in 1690; during the Revolution, it was the state capital, and the Convention met here, 1788, to ratify the constitution of the United States. Pop. in 1860, 14,726.

POULPE (*Octopus*), a genus of *Cephalopoda* (q. v.), of the order *Dibranchiata*; having eight feet or arms, nearly equal, united at the base by a membrane, and very long in proportion to the body. There is no shell, but it is represented by two small grains of horny substance imbedded in the back, one on each side. The arms are used for swimming in water, creeping on land, and seizing prey. Poulpes swim by contractions of the muscular web of the body, which extends upon the arms. They creep on shore in a spider-like manner, with sprawling arms. Like other cephalopods, when alarmed or annoyed, they discharge an inky fluid. One species (*O. vulgaris*) is occasionally found on the British shores, and is more common on the southern shores of Europe, and elsewhere in the Mediterranean. It is the *Polypus* of the ancients. Its arms are six times as long as its body, and each furnished with 120 pairs of suckers. (See *CEPHALOPODA*.)—In warmer seas, very large species occur; and although the stories related of their laying hold of and swamping boats, seizing and killing swimmers, &c., may probably be fabulous, yet it is certain that some of them have arms at least two feet long, and there is probable reason to suppose that much larger species exist, which must be powerful and dangerous creatures. A P., with its eyes fixed on its adversary, and its beak threatening to approach, must have a sufficiently formidable aspect. It was no doubt a P. which Mr Beale encountered on the shore of the Bonin Islands, which he attempted to intercept in its retreat towards the sea, and which turned and fastened upon him, laying hold of him with its arms, and trying to bite him with its parrot-like beak.—*Natural History and Fishery of the Sperm Whale*.

POULTICE. See CATAPLASM.

POULTRY (Fr. *poule*, a hen), a collective name for useful domesticated birds. It is sometimes limited to the domesticated gallinaceous birds, but its ordinary use includes all the birds reared for economical purposes. These belong exclusively to two orders of birds, the *Gallinaceous* and *Palinipid*; the common fowl, pea-fowl, Guinea-fowl, turkey, guan, and pigeon belonging to the former; and the different kinds of duck and goose, as well as the swan, to the latter. For what relates to the different species and their varieties, we refer to these heads; devoting this article to some general remarks as to the management of poultry.

In general, the rearing of poultry is regarded as a very subordinate branch of rural economy, and it is pursued chiefly where agriculture is in a somewhat primitive state, the skilful and enterprising farmer deeming it beneath his attention, or finding that he has not time to attend to it, and often looking on the feathered inmates of his farm-yard almost as a nuisance because of their invasions of his fields. It may pretty safely be asserted that there is no good

kinds are well enough provided by a pretty capacious trough.

Among the diseases of poultry, *Gapes* (q. v.) is one which very frequently demands attention, particularly in young chickens. *Pip* (q. v.) or *Roup* is another. Some of the maladies which cut off great numbers of young chickens, and still more of turkey-poults, may be in a great measure prevented by supplying abundance of nourishing and sufficiently varied food, with water and lime; and by preventing the young birds, particularly turkeys, from getting among wet grass.

It is sometimes taken for granted by writers on this subject, that all the birds which can be domesticated with advantage, have already been domesticated. The assumption is quite gratuitous, and it might as well be asserted that improvement has reached its utmost in any other direction. The concurrent supposition that the common domesticated kinds were given to man at first as domestic, is likewise unsupported by evidence, although the domestication of some of our poultry birds must be referred to a very early date. Among the *Anatides*, some progress has recently been made in the domestication of new kinds; and a beginning may even be said to have been made as to some additional gallinaceous birds.

Much valuable information on the management of poultry will be found in *The Henwife, Her own Experience in her own Poultry-yard*, by Mrs Fergusson Blair of Balthayock (Edin. 2d ed. 1861).

POUNCE, powdered rosin, or some gum resin such as mastic, sandarach, or copal, and also the powder of cuttle-fish bones. It is used for sprinkling over freshly-written writing, to prevent blotting; fine sand is often substituted for pounce. Blotting-paper has almost superseded the use of pounce in Great Britain.

POUND, in English Law, means an enclosure, of which there was generally one in every parish, or at least every manor, in which stray cattle were put and detained until the damage done by them was paid for. Whenever a stranger's or neighbour's cattle trespass on another's lands, the latter can seize them, and take them to the pound, or impound them, as it is called, *damage feasant*, and can keep them there till the expenses are repaid. There was a distinction between pound overt, or common pound, and pound covert, or close pound; in the former case, the owner of the beasts could go and feed and water his cattle while impounded, and it was his duty to do so; but not in the latter case. Now, it is compulsory for the impounder, in all cases, to supply the cattle with food, otherwise he incurs a penalty; and if impounded cattle are not sufficiently fed, a stranger who feeds them may not only trespass on lands to do so, but can recover the costs from the owner of the beasts. This was formerly an important head of law, and it is not obsolete, for the power to impound stray cattle still exists, though common pounds are disappearing, for, in point of law, they are not necessary, since the impounder can put the cattle in his own stable or field.

POUND (Sax. *pund*, Ger. *pfund*, Lat. *pondus*, 'weight') the unit of weight in the western and central states of Europe, differing, however, in value in all of them. The symbol (*lb.*), for it is equally general, and is derived from the Latin word *libra*. The old English pound, which is said to have been the standard of weight from the time of William the Conqueror till that of Henry VII., was derived from the weight of 7680 grains of wheat, all taken from the middle of the ear, and well dried. After this time, the troy pound, which was heavier by

1/16th than the old English pound, became the standard, but it was divided into only 5760 grains. Henry VIII. introduced the *avoirdupois* pound for weighing butcher meat in the market, and it gradually came to be used for all coarse goods in frequent demand; it contained 7000 troy grains. The troy and avoirdupois pounds, both legal measures, continued in regular use from this period—the former being gradually appropriated by jewellers and apothecaries; and, to prevent variation, a brass weight of one pound troy was constructed in 1756, and placed in charge of the clerk of the House of Commons. This weight, in 1824, was declared by act of parliament to be 'the original and genuine standard measure of weight,' and that from which the value of the ounce, grain, pound avoirdupois, &c. were to be deduced, but being, along with the standards of measure, destroyed in 1834, a commission was appointed to consider the best means of replacing them. After long deliberation, hearing of evidence, and sifting of suggestions, it was agreed, *inter alia*, that the standard of weight should be a piece of platinum, weighing 7000 grains (an avoirdupois pound), but that this piece should not be defined with reference to any natural standard. The troy pound thus ceased to be the standard, but its use was allowed to jewellers and (differently divided and subdivided) to apothecaries.

The pound-weight of silver, a common money standard among the ancient Romans, was introduced by them into the countries they conquered, and thus the term 'pound' became a designation of a certain amount of coined money. Thus, now-a-days, the English pound is considered as something (a coin or otherwise) equivalent to 20 shillings, but originally it denoted the pound of silver which was coined into 20 shillings. From Edward II.'s time, the coins were more and more diminished in size, that monarch coining 25 shillings from a pound of silver; while from the same weight of bullion his various successors coined 30, 45, 48, 96, 144, 288, in the time of Elizabeth 60, and (during the reigns of her successors) 62 shillings. George I. coined 66 shillings to the pound of silver, and this rate still continues, the term 'pound' having been completely severed from its original meaning, and appropriated to signify 20 shillings of the present coinage.

POUNDER, the term used in describing the force of a cannon employed in firing solid shot, as a '9-pounder field gun,' a '300-pounder Armstrong,' &c. See **CALIBRE**.

POUSSIN, NICOLAS, a painter of great celebrity, born near Le Grand-Andely, in Normandy, in 1593 or 1594, was first a pupil of Quintin Varin, then painting pictures for the church of Grand-Andely, but at the age of 18 went to Paris, studied under Ferdinand Elle, the Fleming, Lallemand, and others; but chiefly improved himself by drawing from casts, and drawings and prints after Raphael and Julio Romano, in the collection of M. Courtois, who accorded him access to them. After a long and hard struggle, he attained the object of his desire—namely, the means of visiting Rome. He was 30 years of age when he arrived there, and a considerable period elapsed after that before he obtained much employment. At length, however, he received several important commissions from the Cardinal Barberini, which he executed so successfully, that he afterwards rapidly acquired fame and fortune. After an absence of sixteen years, he returned to Paris with M. de Chantelau, and was introduced by Cardinal Richelieu to Louis XIII., who appointed him his painter in ordinary,

Sydenham); statues of Washington for the state of Louisiana, of Calhoun for South Carolina, and Webster for Boston; and busts of Adams, Jackson, Marshall, Van Buren, and other distinguished Americans.

POYNTELL, pavement or tiles laid in small lozenge form.

POZZO DI BORGO, CARLO ANDREA, a celebrated Russian diplomatist, was born at Alala in Corsica, March 8th, 1768, and was educated at the university of Pisa. Returning to Corsica, he adopted the profession of advocate, in which he soon became distinguished for his acuteness, ingenuity, and brilliant eloquence; and about this time an intimacy sprung up between him and the two young Bonapartes, Napoleon (L) and Joseph. P.'s great ability soon gained for him the esteem of Paoli (q. v.), who made him the confidant of his plans, to the intense disgust of the Bonaparte family, who considered themselves slighted. A coolness in consequence sprung up between P. and young Napoleon, which, as their paths in life diverged more and more, passed through the various grades of antagonism, dislike, distrust, and hatred, till, when the latter swayed the sceptre of France, and the former became the supreme trusted adviser of Russia and Austria, it culminated in a deadly struggle for victory between the diplomatist and the warrior, to be ended only by the death of one or the destruction of his power. P. represented Corsica in the French National Assembly (1791—1792); but his party, that which wished to unite liberty and hereditary rule, being overpowered by their 'radical' opponents, he was compelled to return to Corsica, where he again attached himself to Paoli's party; and on the failure of that chief's plans, retired to London. Here he became the agent of the French refugees; and in 1798, having now thoroughly broken with the Bonapartes, he went to Vienna to promote an alliance of Austria and Russia against France, and accompanied the Russian army in the subsequent campaign of 1799. In 1803, he entered the Russian service as a councillor of state, from this time devoting his whole attention to diplomacy. He was at the bottom of the Russo-Austrian alliance, which was dissolved by the battle of Austerlitz (1805); but after the treaty of Tilsit, fearing lest Napoleon might insist upon his surrender, he retired to Austria, from which country Napoleon, in 1809, demanded his extradition. The Emperor Francis refused, but P., to save trouble, retired to England (1810), where he stayed for some time; and then returned to Russia. He soon after induced the Emperor Alexander to make certain custom-house regulations which offended Napoleon, and were a chief cause of the rupture which resulted in the campaign of 1812; he also suggested to the emperor, and effected the seduction of Murat, Bernadotte, and Moreau from the Napoleonic cause; and after the victorious allies had driven Napoleon across the Rhine, P., at the congress of Frankfort-on-the-Main, drew up his famous declaration, 'that the allies made war not on France, but on Napoleon.' From this time, his whole energies were devoted to the task of keeping Alexander inflexible with regard to Napoleon's seductive offers of accommodation; but after his old antagonist's downfall, he exerted himself with equal vigour at Paris (where he signed the treaty of 1815 as Russian ambassador) and Aix-la-Chapelle (1818) to ameliorate, as much as possible, the hard conditions imposed upon France. After the accession of the Emperor Nicholas, he was, though highly esteemed, less confided in, and accordingly accepted the post of Russian ambassador in London; but retired from

public life in 1839, and settled in Paris, where he died 15th February 1842.

POZZUO'LI, a city of Southern Italy, at the east of the bay of Naples, with 14,752 inhabitants; it gives name to a sub-prefecture, and has manufactures of soap. But the interest which attaches to it is drawn from its numerous memorials of classic age. Its cathedral was the Temple of Augustus. There is the Temple of Serapis, an Egyptian god, who was invoked by the priests to render the mineral waters of the place efficacious as remedies. The interior of the temple had a portico of 24 pillars, surrounded by 70 chambers for the sick and for the priests. In the harbour there may still be seen 13 pillars, which formerly supported as many arcades, under which the inhabitants used to congregate to watch for the vessels coming from Africa. There is an arch erected to Antoninus Pius, for having restored 20 of those pillars. There are the remains of an amphitheatre which might have contained 25,000 spectators. The Solfatara (*Forum Vulcani*) is a half-extinct volcano near P., from which springs saline water, used as a remedy for cutaneous diseases. Near the Montenuovo there is the famous Lago d'Averno, enclosed among hills; and at a short distance from it there is the Sibyl's Cave (*La Grotta della Sibilla*), which, however, is nothing more than a subterranean passage from Baja to Averno. On a plain there is an extinct volcano; there Cumæ once stood, now all in ruins. In the environs of P. are to be seen the promontory of Posilipo, the Elysian Fields (*Campi Elysii*) near the harbour of Miseno, and the Lake of Agnano, formerly the crater of a volcano.

P. was probably built by the Cumani (Greek colonists of Cumæ), who gave to its gulf the name of *Cumanus*. They called the new port *De Cæarchia*, a name which was afterwards changed to *Puteoli*, in allusion perhaps to the sulphur wells or springs (*putei*) with which it abounded. Puteoli is first mentioned in history during the Second Punic War, when, by order of the senate, it was surrounded by strong walls. In 214 B. C. it repulsed Hannibal, and from this period rose in importance until, towards the close of the republic, it became virtually the port of Rome, and during the empire was really the first emporium of commerce in Italy. Puteoli was destroyed by Alaric, Genseric, and Totila, and though rebuilt by the Byzantine Greeks, it was exposed to new devastations, to earthquakes, and volcanic eruptions, and soon sank into the decay which continues to mark it.

PRACTICE, in Arithmetic, is the name given to a method, or rather a system of expedients, for shortening or avoiding the operation of compound multiplication. The nature of the expedients will be best understood by an example: Suppose that the price of 64,875 articles at £2, 17s. 6d. is required. It is obvious that the price, at £1, would be £64,875; therefore, at £2, it is £129,750; at 10s., it is the half of that at £1, viz., £32,437, 10s.; at 5s., the half of this last sum, or £16,218, 15s.; and at 2s. 6d., the half of this, or £8109, 7s. 6d. The sum of these partial prices give the whole price—thus,

	s	d.		s	d.
Price at 2 0 0				129750	0 0
" " 0 10 0 (= ½ of £1),				32437	10 0
" " 0 5 0 (= ¼ of 10s.),				16218	15 0
" " 0 2 6 (= ½ of 5s.),				8109	7 6
" " 2 17 6				166515	12 6

The general principle of the method is to decompose the lower denominations of the compound factor into aliquot parts of the higher unit. A

dragged through the streets of Rome; but at a subsequent date, a quarrel having arisen between Louis and the pope, the P. S. was re-enacted. 2. The instrument which settled the empire of Germany in the House of Austria (1439 A.D.). 3. The ordinance by which Charles VI., Emperor of Germany, having no male issue, settled his dominions on his daughter, the Archduchess Maria Theresa, which was confirmed by the diet of the empire, and guaranteed by Great Britain, France, the States General, and most of the European powers. 4. The settlement of the succession of the kingdom of Naples, which was ceded by Charles II. of Spain, in 1759, to his third son and his descendants.

PRAGUE (Ger. *Prag*, Slav. *Praha*), capital of the kingdom of Bohemia, is situated in 50° 5' N. lat., and 14° 30' E. long., on the slope of the hills which skirt both sides of the river Moldau, 251 miles north-east of Vienna by railway. Pop. in 1857, 142,588. P., which ranks as the third city of Germany, presents a highly picturesque appearance from the beauty of its site, and the numerous lofty towers (upwards of 70 in number) which rise above the many noble palaces, public buildings, and bridges of the city. It consists of four principal parts: 1. The Kleinseite, chiefly occupied by the public offices, and the residences of the officials; 2. The Hradschin (or palace district), surmounted by the vast imperial castle, and containing some of the most ancient and interesting churches and palaces of P.; 3. The Jews' Quarter, now known as the Josephstadt, which forms the chief business-quarter, and contains numerous churches, ecclesiastical and educational establishments; 4. The 'New Town,' containing the largest number of streets and open squares, with many modern palaces, charitable institutions, and places of public resort. P. is surrounded by walls and bastions, and has eight gates. The citadel, the ancient residence of the old dukes of Bohemia, is well fortified, and from its elevated position above the Moldau, thoroughly commands the city. P. has 55 Catholic, and 3 Protestant churches, 15 monasteries, and 10 synagogues. Among the most noteworthy of these are the Metropolitan, or St Veita, with its lofty tower, a fine but unfinished specimen of the Gothic of the 14th c., containing the remains of St Ludmilla, first duchess of Bohemia, and of seven kings and emperors of Germany, with the grave of St Wenzelau, and the silver sarcophagus of St Nepomuk (see ST JOHN of NEPOMUK), a popular saint of Bohemia; St Nicolas, or the church of the Jesuits, with its many towers and costly decorations; the Thein Church, built in 1407; the old Hussite church, with the grave of Tycho Brahe, and its marble monuments of the Slavonic martyrs, Cyril and Methodius. Among the numerous public and other buildings of note in P., the following are some of the more interesting: the Royal Palace, the Cathedral, the Theresa Institution for Ladies, the ancient Byzantine church of St George, the Hradschin Square, with the imposing palaces of the primate, the ex-emperor, and Prince Schwarzenberg; the Loretto Chapel, with its gorgeously bejewelled church vessels; the vast Czerni Palace, now used as an institution of charity; the Picture Gallery; the Præmonstratentian monastery of Strahow; the royal library; and at the summit of the Laurensberg, the restored Church of St Lawrence. P. has, however, numerous public gardens and walks in the suburbs, which, with the several royal and noble parks open to the public in the vicinity of the city, afford varied resources for health and open air recreations. The suburb of Karolinenthal, which is traversed by the great viaduct

of the railway, and is of modern growth, has some fine buildings, numerous gardens, barracks, and manufacturing establishments; and somewhat further north is the great botanical garden, with the neighbouring public walks on the Moldau. The university, which is the most ancient in Germany, having been founded in 1348, enjoyed the greatest celebrity in the 15th c., when many thousand scholars came from foreign countries to study in its halls. It is now in a state of activity, after a prolonged period of decay, and has good medical and surgical schools; a library containing, in 1851, 109,880 volumes, and 7762 manuscripts, of which some are very rare; a fine observatory; museums of zoology and anatomy; a botanical garden, &c. P. has also 1 polytechnic, 3 gymnasia, Bohemian and German training schools, and about 20 parish schools. The manufactures include leather, cotton, and linen goods, stockings, printed cottons, machinery of various kinds, beet-root sugar, &c. P. is the great centre of the commerce of Bohemia, and the seat of an important transit trade.

History.—According to popular tradition, P. was founded in 722 by the Duchess Libussa. In the 13th c., its importance was fully recognised; in the 14th and 15th centuries, its munificently endowed university brought foreigners to it from every part, until the decision of the Emperor Wenzelau to favour Bohemian students more than others drove thousands of the scholars with their professors to other spots, and led to the foundation of universities at Leipzig, Ingolstadt, Rostock, and Craeow. In 1424, P. was conquered, and almost destroyed by the Hussites, who had made a successful stand against the emperor Sigismund's army; but after the subsequent defeat and submission of the insurgents, the city was rebuilt. In the Thirty Years' War, it suffered severely, and in 1620 the battle was fought at the White Mountain, near the city, in which the Elector-Palatine, Frederick V., known as the Winter King, and son-in-law of James I. of England, was completely defeated, and compelled to renounce his assumed crown, and to give up the town into the power of the emperor. Swedes and Imperialists successively gained possession of it during the war; and a century later, during the Seven Years' War, it again fell into the hands of different victors, having been compelled, in 1744, to capitulate to Frederick the Great of Prussia; and until the war of deliverance in Germany, and the downfall of Napoleon, the city continued to suffer more or less directly from the troubles in which the house of Austria had been involved. During the last fifty years, it has, however, made rapid strides, and enjoyed prosperity and quiet, except in 1848, when the meeting of the Slavonic Congress within its walls called forth such strongly marked democratic demonstrations on the part of the supporters of Panславism (q. v.), that the Austrian government dissolved the convence, and restored quiet by the summary method of causing the old and new town to be bombarded for two days.

PRAIA GRANDE. See RIO DE JANEIRO, PROVINCE.

PRAIRIE (Fr. meadow) was the name given, by the early French explorers of the northern portion of the Mississippi Valley, North America, to the vast fertile plains which extend from Western Ohio and Southern Michigan, across the states of Indiana, Illinois, Missouri, Arkansas, Iowa, Kansas, and Nebraska and Dakota Territories, including the southern portions of Wisconsin and Minnesota. These great plains or savannas are sometimes flat, but oftener rolling like the long swells of the ocean,

characteristic marks. Bodhisattwa (the name for a deified saint) and Prajñā (wisdom) are synonymous terms; such a term neither arises nor perishes; it exists neither inwardly nor outwardly, because it cannot be seized; but the Bodhisattwa must accomplish his career under this fallacious name; it is his duty, however, to look neither upon form nor anything else as an eternal or non-eternal, as a pure or impure matter, &c. Then only when he is in a condition of complete indifference regarding everything, is he capable of encompassing the whole wisdom. . . . The absence of nature is the nature of everything; all objects are separated from their characteristics. All objects neither appear nor are born, nor disappear, nor cease to be, nor are they pure nor impure, nor are they acquirable nor non-acquirable. Want of understanding is the not understanding that objects are nonentities. From the want of understanding proceed all subjective notions; and through the latter one becomes incapacitated from fulfilling the behests of the sacred doctrine, and from entering the path which leads to wisdom. . . . Everything is like the echo, or a shadow, or anything else without substance. In short, the doctrine of the P. is the entire negation of the subject as well as the object; and whatever be the difference in detail between the points of view from which it looks upon subject or object, or between its comparisons and circumlocutions, the result is always the same: that the object of ascertainment, or the highest wisdom, has no more real existence than the subject striving to attain to it, or the Bodhisattwa.—See E. Burnouf, *Introduction à l'Histoire du Bouddhisme Indien* (Paris, 1844); W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte und Literatur* (St Petersburg, 1860).

PRĀKRIT (from the Sanscrit *prakṛiti*, nature; hence, natural, not accomplished, vulgar) is the collective name of those languages or dialects which are immediately derived from, or stand in an immediate relation to Sanscrit, or 'the accomplished' Language (q. v.) of the Hindus. These languages, however, must not be confounded with those modern languages of India which also have an affinity with the Sanscrit language; for, in the Prākṛit languages, however much they may differ from Sanscrit in their phonetic laws, the words and grammatical forms are immediately derived from that language; whereas, in the modern tongues of India, there is not only no connection between their phonetic laws and those of Sanscrit, but their grammatical forms also are wholly different from those of the ancient language; and while many of their words have no Sanscritic origin, even those which have, shew that they are not immediately drawn from that source. The Prākṛit languages comprise, besides the *Pāli* (q. v.), which generally, however, is not included amongst them, those dialects which are found in the dramas and in the oldest inscriptions. In the dramas, it is women, except female religious characters, and subordinate male personages, who are made to speak in these languages—the use of Sanscrit being reserved for the higher characters of the play—and amongst the former, again, the choice of the special Prākṛit dialect is adapted by the poet to the rank which such a subordinate personage holds, the more refined dialect being appropriated, for instance, to the wives of the king or hero of the play; an inferior Prākṛit to his ministers; others less in degree to the sons of the ministers, soldiers, town-people, and the like; down to the lowest Prākṛit, which is spoken only by servants, or the lowest classes. A work on the poetical art, the *Sāhityadarpana*, enumerates 14 such Prākṛit dialects—viz. the *Sauraseni*, *Māhārāṣṭri*, *Māgadhī*,

Ardhamāgadhī, *Prācya*, *Avantīkī*, *Dākṣiṇyā*, *S'ākartī*, *Bālūkī*, *Drāvidī*, *Abhīrī*, *Chāṇḍī*, *S'wari*, and *Pais'ācī*; but Vāraruchi, the oldest known grammarian of the Prākṛit dialects, knows but four—viz. the *Māhārāṣṭri*, *Sauraseni*, *Māgadhī*, and *Pais'ācī*; and Lassen, in the *Indische Alterthumskunde*, holds that, of those, only the *Sauraseni* and the *Māgadhī* have a really local character—the former, as he assumes, having been the vernacular of a large district of Western, and the latter—which is also the Prākṛit in the inscriptions of King Asoka—of Eastern India; whereas the *Māhārāṣṭri*, or the language of the Mahārrāṭas, does not seem to have been the language of the country the name of which it bears; and the *Pais'ācī*, or the language of the *Pis'ācī*, is obviously merely a fancy name. The principal Prākṛit dialect is the *Māhārāṣṭri*; the lowest, according to some, the *Pais'ācī*, of which two varieties are mentioned; but according to others, the *Apabhramṣa*—which word originally means 'a falling-off'—i. e., a dialect which completely deviates from the grammatical laws of Sanscrit, but in this special application would designate a dialect even inferior to the *Pais'ācī*, and is compared by a grammarian to the language of the reptiles. On the grammar of the Prākṛit languages, see Chr. Lassen, *Institutiones Linguae Pracritice* (Bonn, 1837). The *Sūtras*, or grammatical rules of Vāraruchi, have been edited in the same work; but more elaborately, with a commentary, copious notes, an English translation, appendices, and an index, by Edward Byles Cowell, who has also added to this excellent edition, *An Easy Introduction to Prākṛit Grammar* (Hertford, 1854).

PRASE, a green variety of Quartz (q. v.), sometimes found crystallised in the same forms as common quartz, but more generally massive, or in prismatic and granular concretions. It is rather a rare mineral. It is sometimes cut as an ornamental stone, but is not highly esteemed.

PRATIQUE is, strictly, a limited quarantine. A ship is said to have performed pratique when her captain has convinced the authorities of a port that his ship is free from contagious disease; and he is thereupon permitted to open trade and communication with the shore.

PRAWN (*Palæmon*), a genus of crustaceans, of the order *Decapoda*, and sub-order *Macroura*, in general form resembling lobsters, crayfish, and shrimps, but belonging to a family (*Palæmonidae*) remarkable for a long serrated beak projecting from the carapace. The upper antennæ are terminated by three filaments. There are many species of P., and some of those which inhabit the seas of warm climates attain a large size. Many of them are semi-transparent, and exhibit very fine colours; they are also very active creatures, and most interesting inmates of an aquarium, but are excessively voracious, and apt to make great havoc among its other inhabitants. The COMMON P. (*P. serratus*) attains a length of three or four inches. It is common on the British coasts, although not so abundant as the shrimp, and is generally taken in the vicinity of rocks at a little distance from the shore, and not in rock-pools. It is more esteemed for the table than even the shrimp. Osier-baskets, similar to those employed for catching lobsters, are employed for the capture of prawns; also nets about five or six feet wide, which are pushed along by means of poles, and are called *Putting Nets*. One side of the thorax of a P. is often found remarkably distended. This is owing to a parasitic crustacean, *Bopyrus crangorum*, one of the *Isopoda*, lodged under the carapace.

xii., that 'it is a holy and wholesome thought to pray for the dead, that they may be loosed from their sins.' The continued maintenance of the practice among the Jewish race, is plain from their sacred books; and a still more interesting evidence of its use has recently been discovered in the inscriptions disinterred in several Jewish catacombs of the first three centuries, at Rome and in Southern Italy, which abound with supplications: 'May thy sleep be in peace!' 'Mayest thou sleep in peace!' 'Thy sleep be with the good!' or 'with the just!' &c. Roman Catholics contend that the doctrine, as well as the practice, is equally recognisable in the early Christian Church. They rely on the parable of Lazarus and the rich man (Luke xvi. 19—31) as establishing the intercommunion of this earth with the world beyond the grave; and on Matt. xii. 32, as proving the remissibility of sin or of punishment after death; as well as on 1st Cor. xv. 29, as attesting the actual practice, among the first Christians, of performing or undergoing certain ministrations in behalf of the dead. The Fathers of the 2d, 3d, and still more of the 4th and following centuries, frequently allude to such prayers, as Clement of Alexandria, Tertullian, St Cyprian, and especially St John Chrysostom, Cyril of Jerusalem, and St Augustine. The liturgies, too, of all the rites without exception contain prayers for the dead; and the sepulchral inscriptions from the catacombs, which reach in their range from the 1st till the 5th c., contain frequent prayers in even greater variety, and more directly intercessory, or rather more directly implying release from suffering than those of the contemporary Jews. In the services of the medieval and later church, prayers for the dead form a prominent and striking element. See *REQUIEM*. The Abyssinians have separate services for the dead of all the several conditions and degrees in life, and continue to offer the mass daily for forty days after the death. The Protestant churches without exception have repudiated the practice. In the Burial Service of the first Book of Common Prayer, authorised in the Church of England, some prayers for the deceased were retained; but they were expunged from the second Book; and no trace is to be found in that sanctioned under Elizabeth.

PRE-ADAMITES, supposed inhabitants of the earth anterior to Adam. The author of the opinion, or at least the writer in whose hands it first took a scientific form, was Isaac de la Peyrere, better known by his Latinised name *Pererius*. He was born of a Calvinist family of Bordeaux in 1594, and was attached to the service of the Prince of Condé. His theory was first made public in 1655, in the form of a commentary on the 12th, 13th, and 14th verses of the 5th chapter of St Paul's Epistle to the Romans, which was followed, in the same year, by the first part of a formal treatise on the Pre-adamite hypothesis, and the theological consequences to be derived therefrom. According to his hypothesis, Adam was the progenitor of the Jewish race only, and it is only of him and his race that the Bible is designed to supply the history. Other races existed on earth before that of Adam; but of them the Bible contains no record, nor did the Mosaic law regard them or impose any obligation upon them. It was only under the gospel that they began to be comprehended in the law, which through Christ was given to all the human races of the earth; and it is in this sense that, according to Peyrere, sin is said (Rom. v. 13), to 'have been in the world until the law,' but not to have been 'imputed when the law was not.' For the Pre-adamite race, as the law was not, there was no legal offence. The only evil which Peyrere recognised was natural evil. The same limited interpretation he extended to most other

details of the Mosaic history. Thus, he regarded the deluge as partial, being confined only to the Adamite race. Other miraculous narratives of the Pentateuch and even of other books he restricted similarly. As his book was published in the Low Countries, he fell under the animadversion of the Inquisition, and eventually was arrested in the diocese of Mechlin, but was released at the instance of the Prince of Condé. He afterwards went to Rome, where he conformed to the Catholic religion, and made a full retraction of his erroneous opinions. He was offered preferment by the pope, Alexander VII., but returned in preference to Paris, where he entered the seminary of Notre Dame des Vertus, in which he resided till his death in 1676. The discussion has acquired new interest by recent discoveries of supposed evidences of human art and industry, in positions which, considered geologically, appear to their discoverers to be of an age beyond those limits which the Mosaic chronology assigns to the creation of Adam.

PREBEND (Lat. *præbenda*, from *præbere*, to furnish), the income or other provision assigned for the maintenance of a so-called prebendary, out of the revenues of a cathedral or collegiate church. After the definite constitution of chapters for the maintenance of the daily religious services in the bishop's church, or in other churches similarly established, endowments were assigned to them, which were to be distributed (*præbende*) in fixed proportions among the members. These portions were called *portiones canonice* or *præbende*. To the prebend was commonly attached a residence. The person enjoying a prebend is called a prebendary.—The name prebend is also given to an endowment assigned to a cathedral church for the maintenance of a secular priest.

PRECEDENCE, the order in which individuals are entitled to follow one another in a state procession or on other public occasions. We find questions of precedence arising in very early ages both in Europe and in the East. Where such questions have arisen among ambassadors, as the representatives of different countries, great tenacity has often been shewn in supporting the claims to rank of the states represented. In England, the order of precedence depends partly on the statute 31 Henry VIII. c. 10, partly on subsequent statutes, royal letters patent, and ancient usages. Among questions of precedence depending on usage, there are some which can hardly be considered so settled as to be matter of right, and are in a great degree left to the discretion of the officers of the crown. Formerly, they were adjudicated on by the Constable and Marshal in the Court of Chivalry; and since that tribunal has fallen into abeyance, the practice of persons aggrieved in these matters is to petition the crown, which generally refers the disputed question to the officers of arms. In Scotland, the Lyon Court has the direct jurisdiction in all questions of precedence.

It is a general rule of precedence, that persons of the same rank follow according to the order of the creation of that rank; and in the precedence of the English peerage, it has been fixed that the younger sons of each preceding rank take place immediately after the eldest son of the next succeeding rank. Married women and widows take the same rank among each other as their husbands, except such rank be professional or official, and it is an invariable rule that no office gives rank to the wife or children of the holder of it. Unmarried women take the same rank with their eldest brother; the wife of the eldest son, of any degree, however, preceding the sisters of her husband and all other

takes her rank from her husband. The following tables exhibit the precedence of different ranks as recognised in England.

TABLE OF PRECEDENCE AMONG MEN.

The Sovereign.
The Prince of Wales.
Sons of the Sovereign.
Grandsons of the Sovereign.
Brothers of the Sovereign.
Uncles of the Sovereign.
The Sovereign's Brothers' or Sisters' Sons.
H. H. Prince Leopold, King of the Belgians.
The Archbishop of Canterbury, Primate of all England.
The Lord High Chancellor, or Lord Keeper.
The Archbishop of York, Primate of England.
The Archbishop of Armagh, Primate of Ireland.
The Archbishop of Dublin.
The Lord High Treasurer.
The Lord President of the Privy Council.
The Lord Pr'y Seal.
The Lord Great Chamberlain.
The Lord High Constable.
The Earl Marshal.
The Lord High Admiral.
The Lord Steward of Her Majesty's Household.
The Lord Chamberlain of Her Majesty's Household.
Dukes.
Best Sons of Dukes of the Blood Royal.
Marquises.
Dukes' Eldest Sons.
Earls.
Younger Sons of Dukes of the Blood Royal.
Marquises' Eldest Sons.
Dukes' Younger Sons.
Viscounts.
Earls' Eldest Sons.
Marquises' Younger Sons.
Bishops of London, Durham, and Winchester.
All other English Bishops according to seniority of Consecration.
Bishops of Meath and Kildare.
All other Irish Bishops according to seniority of Consecration.
Secretaries of State, if of degree of a Baron.
Barons.
The Speaker of the House of Commons.
Commissioners of the Great Seal.
Treasurer of Her Majesty's Household.
Comptroller of Her Majesty's Household.
Master of the Horse.
Vice Chamberlain of Her Majesty's Household.
Secretaries of State, under the degree of Baron.
Viscounts' Eldest Sons.
Earls' Younger Sons.
Barons' Eldest Sons.
Knights of the Garter.
Privy Counsellors.
The Chancellor of the Order of the Garter.
The Chancellor of the Exchequer.
The Chancellor of the Duchy of Lancaster.
The Lord Chief Justice of the Queen's Bench.
The Master of the Rolls.
Lord Chief Justice of the Common Pleas.
Lord Chief Baron of the Exchequer.
Lord Justices of the Court of Appeal in Chancery.
Vice chancellors.
Judges and Barons of the degree of the Coll of the said Courts.
Committeemen of the Court of Bankruptcy.
Bannerets made by the Sovereign under the Royal Standard in open war.
Viscounts' Younger Sons.
Barons' Younger Sons.
Bannerets.
Bannerets not made by the Sovereign in person.
Knights of the 1st class.
Knights Grand Crosses of the Bath.
Knights of St Patrick.
Knights Grand Crosses of St Michael and St George.
Knights Commanders of the Bath.
Knights Commanders of St Michael and St George.
Knights Bachelor.
Companions of the Bath.
Cavaliers and Companions of St Michael and St George.
Eldest Sons of the Younger Sons of Peers.
Baronets' Eldest Sons.

Being of the degree of Barons.

Above all of their degree; if Dukes, above all Dukes, &c.

Baronets' Younger Sons.
Acquires of the Sovereign's Body.
Gentlemen of the Privy Chamber.
Esquires of the Knights of the Bath.
Esquires by Creation.
Esquires by Office.
Younger Sons of Knights of the Garter.
Younger Sons of Bannerets.
Younger Sons of Knights of the Bath.
Younger Sons of Knights Bachelor.
Gentlemen entitled to bear Arms.
Clergymen, Barristers-at-law, Officers in the Army and Navy, who are all gentlemen, and have their precedency in their respective professions.
Citizens.
Burgesses.

TABLE OF PRECEDENCE AMONG WOMEN.

The Queen.
The Princess of Wales.
Princesses, Daughters of the Sovereign.
Princesses and Duchesses, Wives of the Sovereign's Sons.
Grand-daughters of the Sovereign.
Wives of the Sovereign's Grandsons.
The Sovereign's Sisters.
Wives of the Sovereign's Brothers.
The Sovereign's Aunts.
Wives of the Sovereign's Uncles.
Duchesses.
Wives of the Eldest Sons of Dukes of the Blood Royal.
Daughters of Dukes of the Blood Royal.
Marchionesses.
Wives of the Eldest Sons of Dukes.
Daughters of Dukes.
Countesses.
Wives of the Younger Sons of Dukes of the Blood Royal.
Wives of the Eldest Sons of Marquises.
Daughters of Marquises.
Wives of the Younger Sons of Dukes.
Viscountesses.
Wives of the Eldest Sons of Earls.
Daughters of Earls.
Wives of the Younger Sons of Marquises.
Baronesses.
Wives of the Eldest Sons of Viscounts.
Daughters of Viscounts.
Wives of the Younger Sons of Earls.
Wives of the Eldest Sons of Barons.
Daughters of Barons.
Maids of Honour.
Wives of Knights of the Garter.
Wives of Bannerets.
Wives of the Younger Sons of Viscounts.
Wives of the Younger Sons of Barons.
Wives of Baronets.
Wives of Knights Grand Crosses of the Order of the Bath.
Wives of Knights Grand Crosses of St Michael and St George.
Wives of Knights Commanders of the Order of the Bath.
Wives of Knights Commanders of St Michael and St George.
Wives of Knights Bachelor.
Wives of Companions of the Bath.
Wives of Cavaliers and Companions of St Michael and St George.
Wives of the Eldest Sons of the Younger Sons of Peers.
Daughters of the Younger Sons of Peers.
Wives of the Eldest Sons of Baronets.
Daughters of Baronets.
Wives of the Eldest Sons of Knights of the Garter.
Daughters of Knights of the Garter.
Wives of the Eldest Sons of Bannerets.
Daughters of Bannerets.
Wives of the Eldest Sons of Knights of the Bath.
Daughters of Knights of the Bath.
Wives of the Eldest Sons of Knights Bachelor.
Daughters of Knights Bachelor.
Wives of the Younger Sons of the Younger Sons of Peers.
Wives of the Younger Sons of Baronets.
Wives of Esquires of the Sovereign's Body.
Wives of Esquires of the Knights of the Bath.
Wives of Gentlemen entitled to bear Arms.
Daughters of Esquires entitled to bear Arms, who are Gentlemen by birth.
Daughters of Gentlemen entitled to bear Arms, who are Gentlemen by birth.
Wives of Clergymen, Barristers-at-law, Officers in the Army and Navy.
Wives of Citizens.
Wives of Burgesses.

At the coronation of Charles I., the rule of 161

precedency of the nobility of England was introduced in Scotland; and it was arranged that peers of England (or their sons, &c.), of a given degree, should within England take precedence of peers of Scotland of the same degree; and that this precedence should be reversed in Scotland. But by the acts of Union of Scotland and Ireland, the precedence in any given degree of the peerage has been established as follows: 1. Peers of England; 2. Peers of Scotland; 3. Peers of Great Britain; 4. Peers of Ireland; 5. Peers of the United Kingdom, and Peers of Ireland created subsequently to the Irish Union. A similar order is understood to obtain in regard to baronets. The relative ranking of the great officers of the crown in Scotland was thus settled by statute in 1623 and 1661:

Lord Chancellor.
Lord Treasurer.
Archbishop of St Andrews.
Archbishop of Glasgow.
Earls and Viscounts according to their ranks.
Bishops according to their ranks.
Lord Privy Seal, } first of their rank.
Lord Secretary, }
Lord President of the Court of Session.
Lord Register.
Lord Advocate.
Lord Justice Clerk.
Lord Treasurer Depute.
Lords of Session, according to their admission.
Barons and Gentlemen, being Councillors, according to their admission.

The right of the judges of the Court of Session, in Scotland, to precede baronets, has generally been admitted.

There are rules for precedence for the members of different professions, recognised among themselves, but which do not confer general social precedence. Doctors in the universities rank thus: 1. Of Divinity; 2. of Law; 3. of Medicine.

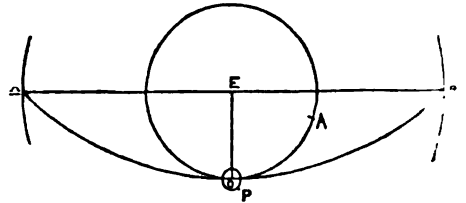
PRECENTOR (Lat. *præ*, before; and *cantor*, a singer), the official in a chapter, whether cathedral or collegiate, whose duty it was to lead the singing. He commenced the psalm or hymn, which was taken up, and repeated either by the celebrant or another of the body, or by the rest of the choir. In modern chapters, the precentor ranks next in dignity to the provost or dean. Among the Presbyterian bodies, the precentor is the official who raises and conducts the psalmody, and is generally provided with a desk immediately beneath the pulpit.

PRECEPT, a legal term, used in Scotch Law in certain departments, generally signifies an order to do something. Thus, a precept of sasine is an order by the superior of lands to his bailie to infeft the vassal. A precept of *clare constat* is an order by a superior to infeft the vassal's heir, so called because the superior is quite satisfied of the propinquity.

PRECEPTORY, the name given to certain houses of the Knights Templar, the superiors of which were called Knights Preceptor. All the preceptories of a province were subject to a provincial superior, called Grand Preceptor; and there were three of these who held rank above all the rest, the grand preceptors of Jerusalem, Tripolis, and Antioch. Other houses of the order were called 'commanderies.'

PRECESSION. If the earth were truly spherical and homogeneous; or if it were composed of spherical layers each of uniform density; or, more generally, if it were such that the resultant of the attractions exerted on all its parts by any other body should always pass through a definite point in its mass, its diurnal rotation would not be affected by the attraction of any other bodies. If originally rotating about a principal axis of Inertia (q. v.), it

would for ever revolve about it, and the direction of the axis would remain fixed in space. To put this in more popular language, the Pole-star (q. v.) would always be the same star. But, although the earth rotates about an axis almost exactly coinciding with its axis of figure, the attraction of various bodies, especially the sun and moon, on the oblate portion at the equator, tends to give it a rotation about an axis in the plane of the equator; and the combination of these two rotations gives rise to a shifting of the instantaneous axis of rotation in the earth and also in space. As already mentioned (see **NUATION**), the earth's axis of revolution describes a waved curve (very nearly circular) about the pole of the ecliptic, and in a direction contrary to that of the order of the signs of the Zodiac (q. v.). This waved curve may be conceived to be described as follows. The pole of the earth, P, revolves in about 19 years in a little ellipse, whose centre, O, travels uniformly in a small circle of the sphere, AO; the centre, E, of the latter is the pole of the ecliptic. The precession is the portion AO of this circle measured from any assumed point, A; and the small arc, OP, by which the true place of the earth's pole differs from its mean place, is the nutation. The nutation is generally resolved along, and perpendicular to, EO; and the components so found are the nutation in ecliptical latitude and longitude. This rough sketch is intended merely to shew the nature of the phenomenon, for the curve described by P about O is only approximately elliptic. Its greatest radius-vector, however, is exceedingly small, amounting only to about eighteen



seconds of arc. AO, also, is not exactly circular, but very nearly so, as its radius, EO, is the obliquity of the Ecliptic (q. v.), which we know varies very little from the angle $23^{\circ} 28'$. The equinoxes, being 90° distant from E, and also from O, which may be taken as the mean place of P, are at \perp and \cap in the diagram. And as O moves round E in the reverse order of the signs, so do the equinoxes, and in the same period—viz., 25,868 years. The effect is, of course, that while the earth's pole describes the small circle, AO, in the heavens, about the pole of the ecliptic, the equinoxes make one complete revolution in the ecliptic against the order of the signs. Thus, in turn, all stars lying near the circle AO become, each for a time, the Pole-star (q. v.). It may seem strange that the term precession should be applied to a retrograde motion; but, from the point of view of the observer, it is evident that the equinox, if on one day it arrive at the meridian of a place simultaneously with a fixed star, will next day arrive at the meridian sooner than the star, or will precede it in time of transit; and this is the origin of the term.

The physical explanation of the cause of precession is almost identical with that of the conical motion of the axis of a top about the vertical; the difference between the two being that, in the case of the top, the conical rotation of the axis takes place in the same direction as the rotation of the top about the axis, while in the case of the earth, the pole of the axis turns about the pole of the

precognitions, when written out. But the word has a technical meaning when applied to the examination of the witnesses before a justice of the peace or the judge-ordinary by the procurator-fiscal, previous to, and by way of enabling him to know how to frame, the charge. On such an occasion, the witnesses are examined or precognosed, a proceeding which corresponds to the evidence given in England before a magistrate or justices of the peace, and called there the depositions.

PREDESTINATION, a theological word, used to denote the eternal decree of God, whereby 'the elect' are foreordained to salvation. The correlative decree, whereby others are held to be foreordained to perdition (though it might with perfect correctness of language be included under the same term), is commonly distinguished by the other term—Reprobation.

The theory of Predestination had, like the doctrine of Election (q. v.), its origin in the attempts of theological system to define the relations of the human and the divine will, and to reconcile the phenomena of human freedom with the belief in divine omnipotence. God's absolute will is represented by it as determining the eternal destiny of man, not according to the foreknown character of those whose fate is so determined, but according to God's own mere choice. They who are thus foreordained to eternal life are led to believe and live by the 'irresistible grace' of the Holy Spirit. In human salvation, therefore, *God's* will is everything; *man's*, nothing. It was in the discussions between Pelagius and Augustine that the Predestinarian view of the divine 'decree' was first fully evolved; and since their time, opinion in the church has run in two great currents—the one perpetuating the influence of Pelagius, who regarded that decree as subordinated to the divine foreknowledge of human character; the other, that of Augustine, who maintained the absolutism of that decree, and its independence of all prior human conditions. Pelagius recognised a possibility of good in human nature; Augustine denied any such possibility, apart from the influences of divine grace. The one held that the choice of salvation lay in man's will; the other, that man's will had no active freedom or power of choice since the fall. In 529, the system of Augustine was established by the Council of Arausio (Orange) as the rule of orthodoxy in the Western Church; but the reaction against the strictly logical yet essentially unmoral nature of his dogma has been perpetually manifested by representatives of the more humane, though perhaps less logical doctrine of Pelagius, in every period of the church. In the days of the schoolmen, the discussions of the Scotists and Thomists—after the Reformation, the contests leading to the condemnation of Arminius in the Council of Dort, and the widening separation that now divides the disciples of Calvin from those theologians who hold broader and freer views on the subject of the *atonement*—indicate the impossibility of the human reason and conscience ever resting satisfied with a merely and absolutely logical theory of the relations between the will of God and the moral responsibility of man. The tendency of modern inquiry seems to be to abandon the discussion of a point so obviously incapable of being determined by human intelligence, and to pursue, instead, examination into the moral and practical bearing upon our human conditions of that which we are able to learn concerning God and His will. The moral meaning of that will is of vital moment to men; the extent of its power over their own wills, they apparently cannot determine.

PREDICABLES. This is a term in the

scholastic logic connected with the scheme of classification. There were five designations employed in classifying objects on a systematic plan: *genus*, *species*, *difference* (differentia), *property* (proprium), and *accident* (accidens). The first two—Genus and Species—name the higher and lower classes of the things classified; a Genus comprehends several Species. The other three designations—Difference, Property, Accident—express the attributes that the classification turns upon. The Difference is what distinguishes one species from the other species of the same genus; as, for example, the peculiarities wherein the cat differs from the tiger, lion, and other species of the genus *felia*. The Property expresses a distinction that is not ultimate, but a consequence of some other peculiarity. Thus, 'the use of tools' is a property of man, and not a difference, for it flows from other assignable attributes of his bodily and mental organisation, or from the specific differences that characterise him. The Accident is something not bound up with the nature of the species, but chancing to be present in it. For instance, the high value of gold is an Accident; gold would still be gold though it were plenty and cheap.

It was by an arbitrary and confusing employment of the notion of Predication, that these various items of the first attempt at a process of systematic classification, were called Predicables, or attributes that might be 'predicated,' that is, affirmed, of things. All that is needful to affirm is that a certain thing belongs to a given species or genus; and that to belong to the species is to possess the specific differences; and to belong to the genus is to possess the generic differences. We may also, if we please, *affirm* (or predicate) that the thing does belong to the species, or does possess the specific difference; but this power of affirming has no need to be formally proclaimed, or made the basis of the whole scheme.

The allied term 'Predicament' is another case where an abusive prominence is given to the idea of predication. The Predicaments, or Categories, were the most comprehensive classes of all existing things—under such heads as substance, attribute, quantity, quality, &c.; and it could be predicated of anything falling under any one head that it does so fall under. Thus, 'virtue' is an attribute; and therefore we might say that 'attribute' can be *predicated* of 'virtue.' But the notion of predicating does not indicate the main fact of the process in this case, any more than 'predicable' in the foregoing. *Classification*, and not predication, is the ruling idea in each.

PREDICATE. See PROPOSITION.

PRE-ESTABLISHED HARMONY. See LEIBNITZ.

PRE-EXISTENCE, DOCTRINE OF. The notion that human souls were in existence before the generation of the bodies with which they are united in this world, was anciently, and is still, widely spread throughout the East. The Greek philosophers too, especially those who held the doctrine of Transmigration (q. v.), as the Pythagoreans, Empedocles, and even Plato—if with him pre-existence is not simply a symbolical myth—were familiar with the conception. Among the early Christians, the assumption of such pre-existence was connected with the belief, that God had created the souls of men before the world, and that these were united with human bodies at generation or at birth. Subsequently, the followers of this opinion were termed *Pre-existencists*, to distinguish them from the *Traducianists*, who held that children received soul as well as body from their parents. Direct intellectual

sought to attain, Norbert organised his new order, which was substantially that of the Canons Regular of St Augustine, as well with a view to the sanctification of the members, as to their usefulness in effecting the reformation of the age. Himself a man of remarkable piety and austerity of life, his rule is a return to the primitive fervour of the monastic institute; and the great work which he proposed for his brotherhood, in addition to the daily choral services of the church, was the practical instruction of the people, and the direction of consciences in the confessional. It was taken up with ardour, and spread rapidly in France and the Low Countries, and afterwards—on Norbert's being chosen, in 1127, Archbishop of Magdeburg—in Germany; the abbot of the mother-house at Coucy, however, retaining the rank of general and of superior of the entire order. It does not seem at any time to have made much progress, or at least to have established many houses, in Italy or Spain. In the same spirit of reformation, Norbert established an order of nuns, which attained to equal success. In the end of the 15th c., the P. O. had no fewer than 1500 convents of men, and 500 of women, nearly all in France, Germany, and the northern kingdoms. A relaxation of the institute having taken place, in the progress of time there was a movement in the order, towards the close of the 16th c. (1573), similar to that which, in the Franciscan Order (q. v.), led to the reform of the so-called conventual Franciscans; but the reformed communities in the Premonstratensian institute remained united with the older body; and in 1630, the reformed rule was accepted by all in common. The order, however, has gradually fallen in popularity. In France, its numbers had declined very much even before the Revolution. Since that event, it may be said to have disappeared, except in Germany, where (in Austria) some magnificent, though thinly peopled houses of the order are still maintained.

PRE'NZLOW, a town of Prussia, in the province of Brandenburg, stands on the northern shore of the lower Lake Ucker, 71 miles north-north-east of Berlin. It contains a mineral spring, several baths, and, among its churches, the beautiful Gothic *Marienkirche*, one of the most remarkable brick buildings in the country; date 1325—1340. Population 13,213, who carry on several manufactures, but are chiefly engaged in growing tobacco and corn, and in breeding and trading in cattle. Here, in October 1806, a body of Prussian troops, 16,000 strong, under the Prince of Hohenlohe, surrendered, after the defeat of Jena, to the French under Murat.

PREPOSITIONS are words that express certain relations between ideas—between the idea of an action and the idea of a thing, or between the idea of one thing and the idea of another thing. 'The river runs *to* the sea. The glass stands *on* the table. The dog lies *under* the table. He runs *round* me. She runs *from* me. The house *by* the wood. The house *in* the wood.' In all the instances just given, the relation is of one kind—that of place or direction. And this was the original signification of all prepositions. They gradually, however, came to express other relations. Thus: 'That depends *on* you. Subjects are *under* the sovereign. She got *round* her father. Vice springs *from* idleness. Wood is consumed *by* fire. Your enemy is *in* your power.' The transition from the palpable, physical relation to the more abstruse mental relation, is, in most cases, obvious.

A preposition is distinguished from an adverb by its always requiring an object (a noun or pronoun)

after it. In the sentence, 'He runs *about*,' *about* is an adverb describing the mode of running; in 'He runs *about* the house,' it is a preposition referring the direction of the running to a particular object.

Many relations are expressed by *prepositional phrases*; as, *instead of*, *with regard to*, *apart from*. The preposition *beside* is evidently an abbreviation of such a phrase—*by the side of*. This tendency in phrases to become simple prepositions, is manifest in other cases. Instead of the full expression, 'on this side of the river,' we often hear, 'this side the river,' where *this-side* has the force of a preposition, and may yet come to be written *thiside*.

Of the relations expressed in the modern forms of the Aryan tongues by prepositions, a great many were formerly expressed by cases. See DECLENSION, INFLECTION, PHILOLOGY.

Along with prepositions are classed certain particles, which, although they may not stand by themselves and govern a case, are yet used in composition with verbs in the same way as the prepositions proper; as in *outrun*, *replace*.

The simple prepositions (Eng. *in*, Dan. *i*, Lat. *in*, Gr. *en*; Eng. *on*, Gr. and Goth. *ana*, Ger. *an*, Slav. *na*; Eng. *of*, Goth. *af*, O. H. Ger. *aba* or *apa*, Ger. *ab*, Sans. *apa*, Gr. *apo*, Lat. *a*, *ab*; Eng. *by* [*be*], Goth. *bi*, Ger. *bei*, Gr. *epi*, Sans. *abhi*; &c.) belong to the primary or radical words of language. They are often identical with the pronominal roots (see PRONOUNS), and along with them form a class of roots whose primary signification is position or relation in space. All attempts, like those of Tooke, to make them derivatives from verbs, are futile. On the contrary, verbs and other parts of speech are often derived from prepositions, as *utter* from *out*; *open* and *upper* from *up*. Some prepositions have a derivative form, as *after* (from the root of *of*), Lat. *inter* (*in*); others are compounded of two prepositions, or a preposition and prepositional particle, as *upon*, *but* (i. e., by out, or be out), *before*, *within*, *into*. Other prepositions, again, contain a noun, as *against* (A. S. *ongegen*, or *tō gegnes*; where, from the forms in the allied languages, the element *gegen* is clearly a substantive, the primary meaning of which, however, has not been made out); *among* (A. S. *gemang* or *ongemang*, *gemang* meaning primarily mixture); *between* (i. e., by or be, two or twain). Such prepositions as *during*, *except*, were originally participles used absolutely; thus, 'during the war' = the war during or lasting, i. e., while the war durèd or lasted; 'except this' = this excepted (*hoc excepto*).

The study of the etymological relations of prepositions is instructive, as shewing how near to one another often lie the most opposed meanings. They are, as it were, the opposite poles of one and the same conception—correlatives depending on a common ground relation, and are thus naturally expressed by words that are radically the same. Thus, Eng. *up* corresponds to Goth. *uf*, Sans. *upa*, Gr. *hypo*, Lat. *sub*. The meaning of *up* is motion from below to above, leaving, however, the idea of the upper terminus the more prominent; *uf*, *hypo*, *sub*, on the contrary, are used to express *under*; but that the notion of upward motion lurked in these roots, is clear from such Latin compounds as *suspicio*, to look up at a thing; *sustineo*, to hold up; and it only required a slight modification—a kind of comparison—to convert them into *ufar*, *hyper*, *super*, meaning 'above'—a result which the English attains by adding the preposition *on* (upon). The same principle is copiously exemplified in the numerous forms and derivatives of the prepositional root FR, in Sans., Gr., Lat., and Sl., PR, in which motion or removal from the speaker in the front direction

by a court, styled in Scotland the Kirk-session, consisting of the minister, or ministers, if there are more than one, and the other elders, the minister or one of the ministers presiding, but each member having equal power and vote. From the decisions of this court, an appeal lies to the Presbytery, which is usually constituted of the ministers of a certain number of congregations and one 'ruling elder' from each congregation. Further appeals may be taken to *Synods* and *General Assemblies*, in churches so large that for convenience the presbyteries of a district are grouped into a 'Provincial Synod,' and all the provincial synods are subordinated to a General Assembly; but in respect of this there are considerable diversities, and the 'supreme' church court, whether *Synod* or *General Assembly*, is variously constituted by direct representation of each congregation, of each presbytery, or of each provincial synod. Nor are diversities of this kind regarded as in the least degree affecting the principle of Presbyterianism.

Presbyterian churches generally recognise an order of *Deacons* (q. v.) as existing in the church, with power only over its secular affairs; but in many Presbyterian churches this office is merged in that of the elder, and all its functions are exercised by the members of the Kirk-session. A tendency to revive the distinct office of deacon, has, however, been recently manifested in some of the Presbyterian churches.

Some Presbyterians maintain the *divine right of presbytery*, as the one system of church government authorised by the Word of God; others only maintain that Presbyterianism is *consistent* with the Word of God; whilst many Presbyterians maintain that the Presbyterian system, whatever its imperfections as existing anywhere, is, of all systems that have ever existed in the church, the most agreeable to the principles of church government which may be deduced from Scripture.

Presbyterianism, variously modified, is the form of church government subsisting in many Protestant churches, but is most perfectly developed in Britain and America. In Britain, it prevails chiefly in Scotland, although on the revolution in the 17th c., it was for a very short time in the ascendant in England also. The *consistorial* system of the continent of Europe (see *CONSISTORY*) cannot, in any of its modifications, be regarded as essentially Presbyterian, although in some respects it approaches to Presbyterianism. The French consistorial system is more nearly Presbyterian than the German, and is not perfectly so only from the pressure of the civil power. In other churches, also, as well as in the Protestant Church of France, Presbyterianism is more or less modified by the relations of the church to the state.

PRESBYTERIAN CHURCH IN AMERICA. The first Presbyterians in America were emigrants from Scotland and Ireland. The first Presbyterian congregations in America were organised in Maryland before the close of the 17th c.—the oldest, that of Snow Hill dating about 1690; and the first presbytery in Philadelphia in 1705. A synod, consisting of four presbyteries, was constituted in 1716. Disensions ensued; but in 1758 the American Presbyterian churches were united in one; and in 1789 a General Assembly was instituted, the whole number of congregations being then 419, and of ministers 188. The increase of the church was rapid, and in 1834 it contained 22 synods, 111 presbyteries, and about 1900 ministers. In 1801, a scheme of union was adopted between Presbyterians and Congregationalists, under which hundreds of congregations were formed in the state of New York and elsewhere. About the beginning of the present century,

the Cumberland Presbyterians (q. v.) separated from the main body; and in 1838, the American Presbyterian Church was divided into two great sections, commonly known as *Old School* and *New School* Presbyterians; the former holding high Calvinistic doctrines; the latter, a somewhat modified Calvinism. Both of these churches are extended over the whole of the United States, and both of them have missions in different parts of the heathen world, their collections for missions forming a large part of the contributions for that object from the United States of America. The Old School Presbyterian Church reckoned, in 1860, 8592 congregations, with more than 2698 ministers, and 292,857 members; the New School, 1483 congregations, 1527 ministers, and 134,983 members. The Old School Presbyterians possess the following theological seminaries: 'Princeton' (Princeton, N. J.), 'Western' (Alleghany City, Pa.), 'Hamden-Sidney' (P. Edward Co., Va.), 'Columbia' (Columbia, S. C.), 'Danville' (Danville, Ky.), and 'Northwest' (Chicago, Ill.). The New School Presbyterians have the 'Union' (New York City), 'Auburn' (Auburn, N. Y.), 'Lane' (near Cincinnati, Ohio), 'Blackburn' (Carlinville, Ill.), and 'Lind' (Chicago, Ill.).—Besides the Cumberland Presbyterians, there are other minor branches of the Presbyterian Church in America, connected with different denominations in Scotland.

PRESBYTERIAN CHURCH IN ENGLAND

The principles of the Puritans (q. v.) were essentially Presbyterian, although many of them were so much occupied with questions of doctrine and discipline, and with resistance to power exercised, as they believed, contrary to the word of God, that they paid little heed to the development of their principles in church government. In general, they felt so much the constraint of circumstances, that they refrained even from the attempt to constitute a church on the principles which they maintained, resting satisfied in giving effect to these principles by mere resistance in particular cases in which their consciences were aggrieved. Yet, in 1572, a presbytery was formed at Wandsworth, in Surrey, by ministers of London and its neighbourhood, separating from the Church of England; and other presbyteries were soon formed, notwithstanding the extreme hostility of Queen Elizabeth. When the Westminster Assembly met in 1643, the Puritans of England were generally inclined to adopt Presbyterianism as their system of church government, although some still preferred a modified Episcopacy, and some had adopted the principles of Independence or Congregationalism. The Presbyterians were, however, the strongest party in the beginning of the Revolution, although the Independents gained the ascendancy afterwards. The establishment of Presbyterian church government in the Church of England was voted by parliament (the Long Parliament), 13th October 1647; but it was never really established. The influence of the Independents prevented it. London and its neighbourhood were, meanwhile, formed into twelve presbyteries, constituting the Provincial Synod of London, which continued to hold regular half-yearly meetings till 1655, the meetings of presbyteries being continued till a later date; but the whole Presbyterian system was overturned by Cromwell's Committee of Triers, appointed for the examining and approving of all persons elected or nominated to any ecclesiastical office. Cromwell's policy aimed at bringing all ecclesiastical matters under the immediate control of the civil power. The Restoration was followed by the fruitless Savoy Conference (q. v.), and soon after by the Act of Uniformity, which came into force on 24th August 1662; and on that day, about

PRESCRIPTION.

tenth of his ample income in charity, and divided his time between his winter mansion in Boston, a summer residence at Nahant, and a farmhouse, where he spent the autumn. In his large library, with the light carefully regulated for his imperfect vision, he wrote with a stylus each day what he had composed, which was then copied, read over, and carefully corrected. His life, by George Ticknor, was published in 1864.

PRESCRIPTION is the term applied to the written direction or receipt given by the physician or surgeon to the chemist for the preparation of a medicinal substance suitable to a special case. In prescribing, the medical practitioner may either order an *official* or an *extemporaneous* compound. Official compounds (or preparations, as they are frequently termed) are those for which formulæ are introduced into the national pharmacopœias, and are therefore supposed to be always at hand in the laboratory of the dispensing chemist (such, for example, as *Mistura Ferri Composita*, *Pulvis Ipecacuanhe Compositus*, *Confectio Aromatica*, &c.); while extemporaneous compounds are those which are devised on the instant with the view of meeting the various peculiarities which almost every case of disease presents. 'Too much importance,' as Dr Paris very truly observes, 'cannot be assigned to the art that thus enables the physician to adapt and graduate a powerful remedy to each particular case by a prompt and accurate prescription. If he prescribes upon truly scientific principles, he will rarely, in the course of his practice, compose two formulæ that shall in every respect be perfectly similar, for the plain reason, that he will never meet with two cases exactly alike.'—*Pharmacologia*, 9th ed., 1843, p. 374.

The author whom we have just quoted, and who is the highest English authority on the subject, lays down *five objects* which the physician should have in view in the construction of an extemporaneous formula or prescription. They are: 1. To promote the action of the principal medicine (or, as he terms it, the *basis*) of a formula. 2. To correct the operation of the *basis*. 3. To obtain the joint operation of two or more medicines which act in totally different ways. 4. To obtain a new and active remedy not afforded by any single substance. 5. To select an eligible form.

The *first object* may be attained (a) by combining different preparations of the same substance, as, for example, tincture of senna with infusion of senna in the ordinary Black Draught; or (b) by combining different substances of a similar action, as, for example, opium with hyoscyamus or conium; or sulphate of magnesia with the preparations of senna; or quinine with the preparations of iron. The *second object* may be obtained in various ways. For example, the addition of extract of hyoscyamus to the compound extract of colocynth renders the purgative action of the latter much less griping, but not less efficacious; the addition of dilute sulphuric acid to a solution of sulphate of magnesia renders that purgative salt less liable to gripe, and makes it sit easier on the stomach; and extract of eleuterium, if given in hot brandy and water, acts equally powerfully as a hydragogue cathartic without causing the depression of the vital powers, which it often occasions if given alone. As an illustration of a mode of attaining the *third object*, we may refer to the operation of purgatives and of diuretics. If we administer a purgative which acts mainly in increasing the peristaltic motion of the intestines, their contents will be urged forward and evacuated, but the operation will be slow and difficult, and probably be accompanied with griping; but if we combine this medicine with one which acts by

increasing the flow of fluids into the intestine, the purgative action will be increased and quickened, and all griping will be avoided. A combination of foxglove, squill, and blue pill or calomel will act much more powerfully as a diuretic than any one of the substances taken alone; and they probably all act in different ways on the system. The *fourth object* is usually attained by chemical decomposition. The activity of the *Mistura Ferri Composita* is due to the carbonate of iron which it contains, and which is yielded by the double decomposition of the two ingredients of the mixture, sulphate of iron and carbonate of potash. By prescribing a mixture of solution of iodide of potassium and corrosive sublimate, we obtain an extemporaneous formation of biniodide of mercury. The Black Wash (see **LINIMENTS**) owes its active ingredient to the decomposition of calomel by lime-water. In some cases, where no chemical action is apparent or probable, a mixture of two or more drugs seems to modify the physiological effect of each ingredient. For example, Dover's Powder contains as its active ingredients ipecacuanha and opium, and yet in well-regulated doses it neither exhibits the nauseating properties of the former, nor the narcotic influence of the latter substance. The *fifth object*, the selection of the most eligible form of the remedy, is of extreme importance. The physician here has to determine whether he shall prescribe his remedy in the form of pill, powder, or mixture; whether he shall administer it as an injection into the lower bowel; whether the patient shall (in certain cases) inhale it; &c. As a general rule, we should accommodate the form and flavour of our remedies, provided we do not sacrifice their virtues, to the taste of the patient, who usually prefers pills to draughts or powders. The unpleasant taste of many medicines which must be given in the fluid form may often be obviated by the skill of the prescriber. Castor oil, cod-liver oil, and copaiba are most easily taken on the surface of orange wine, or water containing a bitter tincture, care being taken to moisten with water the edge or rim of the glass at the part applied to the mouth. The taste of solution of potash and of lime-water is best covered with milk; and the disagreeable flavour of senna is said to be concealed if its infusion is made with strong tea.

In conclusion, it may be remarked that in this country it is the custom to write prescriptions in the Latin language, to abbreviate well-known words, to use symbols for weights and measures, and to commence each prescription with the symbol *R*, which signifies *Recipe*, take. As an illustration, we append a prescription for a tonic draught:

(Name of Patient.)

B. Infus. Calumbæ,	℥. ʒi
Tinct. Calumbæ,	℥. ʒi
Acid. Sulph. Dilut.,	℥. x
Syrup. Aurant.,	℥. ʒiiss

M. Fiat Haustus ter quotidie sumendus.

Date (in Latin).

(Initials or name of prescriber.)

PRESCRIPTION, in Law, is the limit of time within which one may acquire certain legal rights, by reason of the want of vindication by some other person of such rights, and putting in force his legal remedies. In England, however, it has a limited meaning, confined to a certain class of rights relating to lands, such as rights of way, of water-course, of fishing, shooting, &c.; while in Scotland, it is a general term, applicable to all legal rights and to real property; and hence prescription in Scotland corresponds to prescription, *plus Limitation* (q. v.), in England. Prescription in England is thus a

entirely removes all moisture from the vegetables, by drying either in a vacuum or by the aid of heated air, which reduces their bulk more than one-half. They are then compressed under powerful presses, which, beside rendering them extremely portable, also makes them less liable to absorb moisture from the atmosphere, which is very desirable, as they are very absorbent. In this way, both the colour and distinctive flavour of the vegetables are completely preserved, and mere soaking in water restores them almost precisely to their original condition. The introduction of this process has been of great benefit to voyagers, as it enables ships to carry a complete supply of vegetable provisions on the longest voyage.

The method of sealing cooked provisions in air-tight metallic cases, which is now so largely in use, is of comparatively recent invention, and has only been brought into use during the present century. In 1810, Augustus de Heine took out a patent in this country for preserving food in tin or other metal cases, by simply exhausting the air by means of an air-pump; but it was unsuccessful. It was followed by a number of others by various persons, all of which were more or less failures, until Wertheimer's patents, which were three in number, from 1839 to 1841. By his plan, the provisions of whatever kind are put into the metal cases, and closely packed, and the interstices filled in with water or other appropriate liquid, such as gravy in the case of flesh-food. The lids are then soldered on very securely; two small perforations are made in each lid, and the cases are set in a water-bath, in which muriate of lime is dissolved, and heat is applied until the whole boils, and the air is expelled through the small openings in the lids of the cases. When this is complete, which the operator knows by practice, the small holes are quickly soldered up, and the tins are removed from the bath. The muriate of lime is used because its solution can easily be maintained at a heat of 270° to 280° Fahr., without material evaporation. When required for use, it is usual to put the tin-case in a proper vessel, and cover it with water until it boils. The top is then removed by a knife made for the purpose, and the contents are turned out into a dish ready for the table. Henry Gunter, Stephen Goldner, and others patented plans similar in principle, but varying in the mode of applying it. Latterly, a large business of this kind has been successfully carried on by John Gillon & Co., Leith, whose cases of preserved meats and soups are well known as an article of commerce. But the plan in use now is that just described. A very ingenious and scientific plan for preserving meat fresh was invented by Professor George Hamilton of Cheshire. It consists in cutting the meat small, and putting it into jars of binoxide of nitrogen, which perfectly preserves its sweetness and ordinary appearance. This plan has been tried with success on a small scale, and was shewn in the Paris Exhibition of 1855 as a French discovery, although Professor Hamilton's paper was in Paris in 1854.

PRESES OF MEETING, a name given in Scotland to the chairman of a meeting, who is often popularly believed to have some mysterious power or authority; but in point of fact, he has no more power than any other person present, and is merely, for convenience, used as a mouthpiece for putting questions and amendments to ascertain the will of the majority. In meetings of creditors under the Bankrupt Act, a preses requires to be elected before any business is done; but his power is confined to that of constituting the meeting, and preserving order, so far as the creditors mutually

agree to obey his suggestions. As a general rule, a preses, or chairman, has only a single vote, like other persons, and not a casting vote, unless where some act of parliament expressly gives it to him, according to the nature of the meeting held.

PRESS, FREEDOM OF THE, the expression used to denote the absence of any authorised official restraint on publication. The press is an instrument well adapted for disturbing the functions of government, and committing injuries against reputation; and when its power as a political engine was first discovered, the European governments took it into their own hands, no one being allowed to print any work till it had obtained the sanction of the proper authorities. The clergy also, on behalf of the papal hierarchy, claimed a share in the censorship, where questions of religion were concerned. In England, at the Reformation, the control of the press came to be more completely centred in the crown than elsewhere, the ecclesiastical in addition to the secular department being vested in Henry VIII. as temporal head of the church. The Company of Stationers, who came to have the sole right to print, were servants of the government, subject to the control of the Star Chamber. The censorship of the press was enforced by the Long Parliament, and was re-established more rigorously at the Restoration. It was continued at the Revolution, and the statute regulating it was renewed from time to time till 1693, when the Commons, by a special vote, struck it out of the list of temporary acts to be continued. Since that time, the censorship of the press has ceased to exist in Britain. But though there are no official restrictions on what shall and what shall not be published, the authors and publishers of criminal or injurious matter are amenable to the law of libel; and there are certain statutory requirements in force to enable them to be traced. The existing statutes which apply to all printed publications are 39 Geo. III. c. 79, amended by 51 Geo. III. c. 65, and 2 and 3 Vict. c. 12. Every person who possesses a printing-press or types for printing, and every typesetter, must give notice to the clerk of the peace. Every person selling types must give an account of all persons to whom they are sold. Every person who prints anything for hire or reward must keep one copy at least of the matter printed, and write on it the name and place of abode of the person who employed him to print it. By statute 2 and 3 Vict. c. 12, every person who shall print any paper meant to be published, must print on the front of the paper, or on the first or last leaf, his name and usual place of business; and on failure to do so, he forfeits the sum of £5, which penalty can, however, be sued for only in name of the Attorney or Solicitor-general, or the Lord Advocate of Scotland. A few exceptions exist to the above requirement in the case of papers printed by parliament or government offices, engravings, auction lists, bank-notes, bills of lading, receipts for money, and a few other instances. The statutes affecting newspapers are 60 Geo. III. and 1 Geo. IV. c. 9, 2 Geo. IV. and 1 Will. IV. c. 73, and 6 and 7 Will. IV. c. 76. The publisher of a newspaper must, under a penalty of £20, enter into a recognisance or bond of £400 or £300, together with sureties to pay any fine that may be adjudged against him for publishing a blasphemous or seditious libel. Before publication, he must furnish the correct title of his newspaper, and the names and addresses of the printer, publisher, and (with certain restrictions) of the proprietors. At the end of every newspaper must be printed the Christian name and surname of the printer and publisher. A copy must also be sent to the Stamp Office, authenticated so that it may be produced in evidence at any trial. The

refinement of thought. His literary and political essays are among the soundest, the most acute, the most scholarly, and the most elegant that have proceeded from the French journalists of the Empire. We may mention in particular his *Elisabeth et Henri IV.*; *Jonathan Swift* (in Latin); *Revue de l'Histoire Universelle* (1854); *Du Rôle de la Famille dans l'Education* (1857); *Nouveaux Essais de Politique et de Littérature* (1862).

PRIAM, in Homeric legend, was king of Troy at the time of the Trojan war. His father was named Laomedon, and his mother Strymo or Placia. P. is said to have been originally called *Podarkes* (the Swift-footed), but to have received his later and better-known appellation (from *Priamai*, to ransom) on account of having been ransomed by his sister Hesione from Herakles, into whose hands he had fallen. His first wife was Ariabe, daughter of Merope, whom he gave away to a friend in order to marry Hecuba, by whom, according to Homer, he had nineteen sons; but as his intercourse with the other sex was not limited to Hecuba, the epic poet gives him in all 50 sons; while later writers add as many daughters. The best-known of these are Hector, Paris, Desphobos, Helenus, Troilus, and Cassandra. P. is represented as too old to take any active part in the Trojan war; and in Homer, only once appears on the field of battle. The oldest Greek legends—i.e., the Homeric, are silent respecting his fate; but the later poets—Euripides, Virgil, &c.—say that he was slain by Pyrrhus at the altar of Zeus Herkeios, when the Greeks stormed the city.

PRICE, RICHARD, was born at Tynton, in Wales, on 22d February 1723. His father, Rice Price, was a dissenting minister, possessed of some wealth, and remarkable for his intolerance. A leading characteristic of his son's mind, on the other hand, was the calm resolution with which, from his youth, he declared his own opinions, and advocated freedom of thought for others. He declined to bend his convictions to paternal authority; accordingly, on his father's death, Richard was so poorly provided for, that, having resolved to prosecute his studies in London, he was obliged to make the journey chiefly on foot. He obtained admission to a dissenting academy, where he acquired a good knowledge of mathematics, philosophy, and theology. At the end of four years, he engaged himself as chaplain to a Mr Streatfield, with whom he lived for thirteen years. Mr Streatfield, on his death, left P. some property; and his circumstances having been further improved by the death of an uncle in 1757, he was enabled to carry out a matrimonial engagement which he had formed with a Miss Blundell.

He then settled as a preacher at Hackney; but being shortly afterwards chosen minister at Newington Green, he removed to that place, where he lived till the death of his wife in 1786, when he returned to Hackney. Meanwhile, his life had been one of considerable literary and scientific activity. His *Review of the Principal Questions and Difficulties in Morals* (Lond. 1758), though a somewhat heavy work, established his reputation as a metaphysician and a moralist. In 1769, the degree of Doctor of Divinity was conferred on him by the university of Glasgow. In the same year, he published his *Treatise on Reversionary Payments*; this was followed by the compilation and publication of the celebrated *Northampton Mortality Tables*, and various other works relating to life-assurance and annuities, forming most valuable contributions to the branch of science to which they refer. In 1776, appeared his *Observations on Civil Liberty and the Justice and Policy of the War with America*. Of this work,

60,000 copies are said to have been sold in a few months. So greatly was it admired in the United States, that, in 1778, the American Congress, through Franklin, communicated to him their desire to consider him a fellow-citizen, and to receive his assistance in regulating their finances; an offer declined principally on the ground of age. He died April 19, 1791. P. was a believer in the immateriality of the soul, holding that it remained in a dormant state between death and resurrection. Their difference of opinion on this subject led to a controversy of some celebrity between him and his friend Dr Priestley. His views respecting the Son of God were what is called Low or semi-Arminian. His moral character appears to have been a singularly beautiful one. 'Simplicity of manners,' says Dr Priestley, 'with such genuine marks of perfect integrity and benevolence, diffused around him a charm which the forms of politeness can but poorly imitate.' See *Memoirs of the Life of Richard Price, D.D.*, by William Morgan, F.R.S., Lond. 1815.

PRICHARD, JAMES COWLES, a distinguished ethnologist and physician, was born at Ross, in Herefordshire, on the 11th of February 1786. His father, Thomas Prichard, a member of the Society of Friends, and a merchant, had been married young, and was early left a widower with four children, upon whose education he bestowed the greatest care. Of these children, James Cowles, the eldest, was educated at home under private tutors. He learned Latin and Greek from a Mr Barnes; French from an *émigré* named De Rosemond; and Italian and Spanish from an Italian named Mordenti—while his father himself taught him history, for the study of which young P. shewed a strong predilection. At Bristol, where his father resided for some time in the pursuit of his business, the embryo ethnologist gave the first indications of his love for the study in which he afterwards became famous. On the quay, he met with foreigners from every country, and took much interest in observing their physical appearance, occasionally conversing with the sailors and others, as well as he was able, in their native tongues. On retiring from business, his father again took up his abode at Ross, where the son continued to pursue his studies under private tutors. When the time for choice of a profession arrived, young P. chose that of medicine as the one he thought most akin to his ethnological pursuits. He accordingly became a student of medicine, first at Bristol, afterwards at St Thomas's Hospital, London, and finally at Edinburgh, where he took his degree of M.D. Before commencing practice, however, he entered himself a student at Trinity College, Cambridge, where he read mathematics and theology for the most part. Subsequently, he studied at St John's College and Trinity College, Oxford. In 1810, he commenced practice in Bristol as a physician. His talents were soon recognised, both privately and publicly. He was first appointed physician to the Clifton Dispensary and St Peter's Hospital, and afterwards physician to the Bristol Infirmary. In 1813, he published his first work, *Researches into the Physical History of Mankind*, which at once gave him a high standing as an ethnologist. Of this, a second and enlarged edition, in two vols., appeared in 1826; and a third, still further improved and enlarged, in five vols., appeared between the years 1836 and 1847. The second and third editions of this work, each in succession, gave remarkable proofs of the extraordinary zeal with which Dr P. pursued his ethnological investigations; and not only so, for at the same time he devoted himself much to the pursuit of philology, which he rightly

with much learning, but less discernment, the affairs of ancient Egypt, Assyria, Persia, Judea, Greece, and Rome, as far as they bear on the subject of sacred prophecy. P. was a zealous but not an intolerant churchman, most conscientious in the discharge of his own duties, equally anxious that others should do theirs, and possessed of a considerably greater share of piety than was usual in his age.

PRIESSNITZ, VINCENT, the founder of Hydro-pathy (q. v.), was born at Gräfenberg (q. v.), in Austrian Silesia, October 5, 1799. He was the son of a peasant-proprietor, and received at the school of Freiwaldau an education suitable to his station, and afterwards farmed his paternal estate. It appears that a neighbour, who had been in the way of healing trifling wounds on himself and others by means of cold water, treated P. successfully in this way for a serious injury from the kick of a horse; and P., having thus had his attention directed to the virtues of cold water, and being indisputably possessed of great sharpness of intellect and aptitude for the practice of the healing art, began to give advice to his neighbours how to cure all ailments with cold water, and soon attained considerable reputation among them. Although several times brought before the authorities for unlicensed practising, the simplicity of the means he used made it impossible to interfere with him. As the number of applicants for advice went on increasing, he gradually came, by experimental modifications of the way of applying his remedy, to form a kind of system of treatment for the various cases that presented themselves. At last, about 1826, strangers began to repair to Gräfenberg, and stay there for some time for treatment; in 1829, there were as many as 49 water-patients, and in 1837, the number had risen to 586. P. continued till 1833 to carry on his farming; but after that, his practice, and the care of the establishments which he had to provide for the reception and treatment of his patients, fully occupied him. He died November 28, 1851, leaving his establishment to his son-in-law. Very different judgments have been pronounced on the character of P. and his system of treatment, mostly according to the prejudices of the critics. He himself has left nothing in writing on his method of cure.—Wunde, *Die Gräfl. Wasserheilanstalt und die P'sche Curmethode* (6th ed. Leip. 1815).

PRIEST (Gr. *presbyteros*, Lat. *presbyter*, Fr. *prêtre*), the title, in its most general signification, of a minister of public worship, but specially applied to the minister of sacrifice or other mediatorial offices. In the early history of mankind, the functions of the priest seem to have commonly been discharged by the head of each family; but on the expansion of the family into the state, the office of priest became a public one, which absorbed the duties as well as the privileges which before belonged to the heads of the separate families or communities. It thus came to pass that in many instances the priestly office was associated with that of the sovereign, whatever might be the particular form of sovereignty. But in many religious and political bodies, also, the orders were maintained in complete independence, and the priests formed a distinct, and, generally speaking, a privileged class (see *Egyptian Priests*, *Indian Priests*, below). The priestly order, in most of the ancient religions, included a graduated hierarchy; and to the chief, whatever was his title, were assigned the most solemn of the religious offices intrusted to the body. In sacred history, the patriarchal period furnishes an example of the family priesthood; while in the instance of Melchizedec, king of Salem, we find the union of the royal with the priestly

character. In the Mosaic law, the whole theory of the priesthood, as a sacrificial and mediatorial office, is fully developed. The priest of the Mosaic law stands in the position of a mediator between God and the people; and even if the sacrifices which he offered be regarded as but typical and prospective in their moral efficacy, the priest must be considered as administering them with full authority in all that regards their legal value. The Mosaic priesthood was the inheritance of the family of Aaron, of the tribe of Levi. It consisted of a high priest (q. v.), and of inferior ministers, distributed into 24 classes. The age for admission to the priesthood is nowhere expressly fixed; but from 2d Chronicles xxxi. 17, it would seem that the minimum age was 20. In the service of the temple, the priests were divided into 24 classes, each of which was subject to a chief priest, and served, each company for a week, following each other in rotation. Their duties in the temple consisted in preparing, slaying, and offering victims; in preparing the shew-bread, burning the incense, and tending the lights of the sanctuary. Outside, they were employed in instructing the people, attending to the daily offerings, enforcing the laws regarding legal uncleanness, &c. For their maintenance were set aside certain offerings (see *FIRST-FRUILTS*) and other gifts. They wore a distinguishing dress, the chief characteristics of which were a white tunic, an embroidered cincture, and a turban-shaped head-dress. The Jewish priesthood may be said to have practically ceased with the destruction of the temple.

In the Christian dispensation, the name primitively given to the public ministers of religion was *presbyteros*, of which the English name 'priest' is but a form derived through the old French or Norman *prestre*. The name given in classical Greek to the sacrificing priests of the pagan religion, Gr. *hierews*, Lat. *sacerdos*, is not found in the New Testament explicitly applied to ministers of the Christian ministry; but very early in ecclesiastical use, it appears as an ordinary designation; and with all those bodies of Christians, Roman Catholics, Greeks, Syrians, and other orientals who regard the Eucharist as a sacrifice (see *MASS*), the two names were applied indiscriminately. The priesthood of the Christian church is one of the grades of the Hierarchy (q. v.), second in order only to that of bishop, with which order the priesthood has many functions in common. The priest is regarded as the ordinary minister of the Eucharist, whether as a sacrament or as a sacrifice; of baptism, penance, and extreme unction; and although the contracting parties are held in the modern schools to be themselves the ministers of marriage, the priest is regarded by all schools of Roman divines as at least the normal and official witness of its celebration. The priest is also officially charged with the instruction of the people and the direction of their spiritual concerns, and by long-established use, special districts, called Parishes (q. v.), are assigned to priests, within which they are intrusted with the care and supervision of the spiritual wants of all the inhabitants. The holy order of priesthood can only be conferred by a bishop, and he is ordinarily assisted by two or more priests, who, in common with the bishop, impose hands on the candidate. The rest of the ceremonial of ordination consists in investing the candidate with the sacred instruments and ornaments of his order, anointing his hands, and reciting certain prayers significative of the gifts and the duties of the office. The distinguishing vestment of the priest is the *chanble* (Lat. *pluvium*). In Roman Catholic countries, priests wear even in public a distinctive dress, which, however, in most

and so strict, in ancient times, were the obligations imposed upon a priest, that any defective knowledge on his part, or any defective performance by him of the sacrificial rites, was supposed to entail upon him the most serious consequences both in this life and in the future. As the duration of a Hindu sacrifice varies from one to a hundred days, the number of priests required at such a ceremony is likewise stated to be varying; again, as there are sacrificial acts at which verses from the R'igveda only were recited, others requiring the inaudible muttering of verses from the Yajurveda only; others, again, at which verses only of the Sāmaveda were chanted; and others, too, at which all these three Vedas were indispensable—there were priests who merely knew and practised the ritual of the R'igveda, or the Yajurveda, or the Sāmaveda; while there were others who had a knowledge of all these Vedas and their rituals. The full contingent of priests required at the great sacrifices amounts to 16. Other inferior assistants at a sacrifice, such as the ladle-holders, slayers, choristers, and the like, are not looked upon as priests. Such was the staff of priests required at the great and solemn sacrifices, which took place on special occasions, and could be instituted only by very wealthy people; from one to four priests, however, sufficed at the minor sacrifices, or those of daily occurrence. These were the rules and practices when the Hindu ceremonial obeyed the canon of the Vaidik ritual; and the latter probably still prevailed at the epic period of India, though many deviations from it are perceptible in the Mahābhārata and Rāmāyaṇa (q. v.). But at the Paurāṇik period, and from that time downwards, when the study of the Vedas had fallen into disuse, and the Vaidik rites had made room for other ceremonies which required no knowledge on the part of a priest, except that of the reading of a prayer-book, and an acquaintance with the observances enjoined by the Pūrāṇas, but easy to go through, almost every Brāhman, not utterly ignorant, became qualified to be a priest.—For the priesthood of the Buddhists, Jains, and Tibetans, see BUDDHISM, JAINAS, and LAMATISM.

PRIESTLEY, JOSEPH, son of Jonas Priestley, a cloth-draper at Fieldhead, near Leeds, was born at Fieldhead on 13th March 1733, O.S. His mother having died when he was six years old, he was adopted by an aunt, by whom he was sent to a free school. There he learned Latin and Greek. During vacation, he taught himself various languages, both ancient and modern. For some time he was obliged to abandon his studies, owing to weak health: he then betook himself to mercantile pursuits. With returning strength, his literary studies were resumed, and successfully prosecuted at a dissenting academy at Daventry under Mr (afterwards Dr) Ashworth, successor to Dr Doddridge. Though his father and aunt were strong Calvinists, their house was the resort of many men who held very different opinions; and the theological discussions which he was in the habit of hearing, seem to have had much effect on young P.: before he was 19, he calls himself rather a believer in the doctrines of Arminius, but adds: 'I had by no means rejected the doctrine of the Trinity or that of the Atonement.' Before leaving home, he wished to join a Calvinistic communion, but he was refused admission, the ground of refusal being, that he had stated doubts as to the liability of the whole human race to 'the wrath of God and pains of hell for ever.' During his residence at the academy, he conceived himself called on to renounce nearly all the theological and metaphysical opinions of his youth. 'I came,' he says, 'to embrace what is called the heterodox side of every

question.' In 1755, he became minister to a small congregation at Needham Market, in Suffolk, with an average salary of £30 per annum. While here, he composed his work entitled *The Scripture Doctrine of Remission, which shows that the Death of Christ is no proper Sacrifice nor Satisfaction for Sin*. His leading theological doctrine seems to have been, that the Bible is indeed a divine revelation, made from God to man through Christ, himself a man and no more, nor claiming to be more. He seems to have rejected all theological dogmas which appeared to him to rest solely upon the interpretation put upon certain passages of the Bible by ecclesiastical authority. Even the fundamental doctrines of the Trinity and of the Atonement he did not consider as warranted by Scripture, when read by the light of his own heart and understanding. It does not, however, appear that these doctrinal errors produced any morally evil results. He not only contrived to live on £30 a year; but by adding a little to his income by means of teaching, he was enabled to purchase a variety of instruments to help him in his scientific studies. In 1758, he quitted Needham for Nantwich; and in 1761 he removed to Warrington, where he was appointed successor to Mr (afterwards Dr) Aikin, as teacher of languages and belles-lettres. At Warrington, he married Miss Wilkinson, a lady of great talent and amiability. Here his literary career may be said first fairly to have begun. A visit to London led to his making the acquaintance of Franklin and of Dr Price. The former supplied him with books which enabled him to write his *History and Present State of Electricity*, published in 1767. It was followed by a work on *Vision, Light, and Colours*. In 1762, he published his *Theory of Language and Universal Grammar*. In 1766, he was made a member of the Royal Society, and a Doctor of Laws by the university of Edinburgh. In the following year, he removed to Millhill, near Leeds, where he was appointed minister of a dissenting chapel. The fact of a brewery being beside his dwelling gave a new direction to his energetic and versatile mind; he began to study pneumatic chemistry, publishing various important works connected with this science. 'No one,' says Dr Thomson, 'ever entered on the study of chemistry with more disadvantages than Dr Priestley, and yet few have occupied a more dignified station in it.' While at Leeds, he agreed to accompany Captain Cook on his second voyage; but certain ecclesiastics having objected to the latitude of his theological views, the Board of Longitude refused to sanction the arrangement, and he did not go. In 1773, he was appointed librarian and literary companion to Lord Shelburn, with a salary of £250 per annum, and a separate residence. He accompanied the earl on a continental tour in the year 1774. Having been told by certain Parisian savans that he was the only man they had ever known, of any understanding, who believed in Christianity, he wrote, in reply, the *Letters to a Philosophical Unbeliever*, and various other works, containing criticisms on the doctrines of Hume and others. His public position was rather a hard one; for while laughed at in Paris as a believer, at home he was branded as an atheist. To escape the odium arising from the latter imputation, he published, in 1777, his *Disquisition Relating to Matter and Spirit*. In this work, while he partly materialises spirit, he at the same time partly spiritualises matter. He holds, however, that our hopes of resurrection must rest solely on the truth of the Christian revelation, and that on science they have no foundation whatever. The doctrines of a Revelation and a Resurrection appear with him to have supported one another. He

the other brothers and the sisters are not otherwise provided for out of the personality they are left testate. If the eldest son is dead, but has left an eldest son, such grandson of the deceased, in like manner, succeeds to the whole lands exclusively, and so on, following in succession, the eldest sons of eldest sons, and their next eldest sons, one by one, in their order of seniority. But when the male line is exhausted, then females do not succeed in the same way singly and by seniority, but all together succeed jointly. Such is the rule in England and in Scotland. The preference of males to females was also the Jewish rule and the Greek rule, or at least that which prevailed at Athens; but it was unknown to the Romans. It is generally said our preference of males took its origin from the feudal system, by which the devolution of land depended on the personal ability of the party to perform military service. Our Danish ancestors seem not to have acknowledged any preference of the males, but the Saxons did so. Our law does not, like the Saho law, totally exclude females, but merely postpones them until the males are exhausted. Though, however, it is the general law of England, as well as Scotland and Ireland, there is one county in England, that of Kent, where, by ancient custom—called gavelkind—a different rule prevails, and the land, instead of going wholly to the eldest son, is divided equally among all the sons. So there is an exception, called Borough English, in some boroughs and cities of England, where the land, instead of going to the eldest son, goes wholly to the youngest son. The evils said to be attendant on the law of primogeniture are alleged to be, that it often produces great hardship, by making one of the family enormously rich, and the others very poor, thereby introducing a sense of inequality and injustice among those who are apt to believe themselves equals by the law of nature. It also tends to encourage the accumulation of landed property in a few hands, and thereby cuts off the great mass of the people from the gratification of a natural desire and from one incentive to industry—viz, the acquisition of a portion of the soil. On the other hand, it is said that the cases of hardship in reality seldom occur, for, especially in modern times, an equal amount of personal property is often held by the same owners, and the rule does not apply to personality, which is equally divided among all the children. Moreover, the great landowners seldom die intestate, but almost invariably provide for their younger children by means of charges or burdens on the family estate, and so counteract the effect of the law of primogeniture. The accumulation of landed property is said to be not an evil, but the contrary, for it enables agriculture to flourish, inasmuch as the larger the farms, the greater is the capital required, and the greater benefit to the land, and ultimately to the public. The law of primogeniture in England is not as it is or was in Scotland, stereotyped in its most odious form by the practice of entailing the lands, and so locking them up for generations in one family, excluding them from commerce, and of necessity preventing the successive heirs in possession from making improvements. The evils of the Scotch entail system have long been exposed, and led, in 1848, to a relaxation of the law, by which the practice of disentailing the property is made more easy and frequent. But in England, land cannot be locked up for a greater period than the lives of persons in existence, and for 21 years more, after which the parties entitled can sell or bring the lands into the market at their discretion; so that it is not correct to say that the accumulation of land in the great families is caused by the law of primogeniture, for practically each

successive generation can do what it likes with the property, and squander it at will. It is only by the operation of the natural feelings of family pride that the family estates are kept together in a family. The mode in which this is practically done in England is as follows: the peer or head of the family being tenant for life, and the inheritance being entailed upon his eldest son, who is about to marry, the father and son take the proper legal steps (which they can always do jointly) for unsettling the estate, and obtaining the absolute dominion over it. They then proceed to resettle the estate, making the father as before tenant for life, then the son is reduced in his turn to a tenant for life also, after the father, instead of, as before, being tenant in tail, or full proprietor. Thus, the maintenance of the family dignity is secured for another generation by settling the inheritance on the eldest male issue of the intended marriage; and when the grandson attains the age of 21, or is about to marry, he and his father act in the same way towards the next generation. The English law of landed property has been said to answer admirably all the purposes to which it is applicable, for a testamentary power is given which stimulates industry, and encourages accumulation; and while capricious limitations, such as perpetual entails, are restrained, property is allowed to be moulded according to the circumstances and wants of every family.

PRIMROSE (*Primula*), a genus of plants of the natural order *Primulaceae*, having a bell-shaped or tubular 5-toothed calyx, a salver-shaped corolla with five segments, five stamens, a globose germeo containing many ovules, and a many-seeded capsule opening by five valves, and generally with ten teeth at the apex. The species are all herbaceous perennials, generally having only radical leaves; and the flowers in a simple umbel, more rarely with scapes bearing solitary flowers. Almost all of them are natives of Europe and the north of Asia. Some of them are among the finest ornaments of our groves and meadows; some are found in mountainous regions. Their fine colours and soft delicate beauty have led to the cultivation of

Common Primrose (*Primula Vulgaris*).

some of them as garden flowers, probably from the very beginning of floriculture. The name *P.* (*Fr. Primrose*, Lat. *Primula*) is derived from the Latin *primus*, first, and refers to the early appearance of the flowers of some of the most common species in spring.—The Common *P.* (*P. vulgaris*), abundant in woods, hedgebanks, and pastures in Britain and in most parts of Europe, has obovate-oblong, wrinkled leaves, and single-flowered scapes; the flowers about an inch broad, yellowish white. This is the plant to which the English name *P.* specially belongs. Akin

11,000 pupils. In 1862, £11,000 was disbursed from the colonial treasury for public education. The island is divided into 3 counties—Prince, Queen's, and King's counties—of which the chief towns are respectively Summerside, Charlottetown, and Georgetown. All parts of the island are traversed by coach-roads; and 50 miles of telegraph, 10 miles of which are submarine, belong to the island. Of the entire population, 44,975 are Protestants of different denominations, and 35,882 are Roman Catholics. The island was first taken possession of by the British in 1745, and was retaken by them, and finally annexed to their possessions in 1758.

PRINCE OF WALES, the title borne by the eldest son of the sovereign of England. The native sovereigns of Wales were so designated in the days of Welsh independence; and on the conquest of Wales, the principality of Wales and earldom of Chester were bestowed by Henry III. on his son, afterwards Edward I., but as an office of trust and government, rather than as a title. It is traditionally related that Edward I. engaged to give the Welsh people a prince who would be born among them, and not know a word of English, and fulfilled the promise by bestowing the principality on his infant son, Edward, born at Caernarvon Castle. Edward, by the death of his elder brother, became heir-apparent. Edward III., his son, was never Prince of Wales; but in 1343, he invested his son Edward the Black Prince with the principality, and from that time the title of Prince of Wales has been borne by the eldest son of the reigning king. The title is, however, not inherited, and has usually been bestowed by patent and investiture, though, in a few instances, the heir to the throne has become Prince of Wales simply by being so declared. The eldest son of the sovereign is by inheritance Duke of Cornwall, a title first conferred in 1337 on Edward the Black Prince, on the death of his uncle, John of Eltham, the last Earl of Cornwall, and held, according to the terms of the grant, by the first-begotten son of the king. The title of Earl of Chester, borne by Edward III. before his accession to the throne, has since been given along with the principality of Wales. That earldom was, by 21 Richard II. c. 9, erected into a principality; and it was enacted that it should be given in future to the king's eldest son—a precedent which has since been followed, although that statute, along with all others in the same parliament, was repealed by 1 Henry IV. c. 3. On the death of a Prince of Wales in his father's lifetime, the title has been conferred on the sovereign's grandson, or next younger son, being heir-apparent. As heir of the crown of Scotland, the eldest son of the sovereign is Prince and High Steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles. The high office held by the House of Stewart (see STEWART, HOUSE OF) became merged in the crown when Robert II., the representative of the family, ascended the throne of Scotland in 1371. The earldom of Carrick was conferred by Robert II. on his eldest son. The dukedom of Rothesay was created by a solemn council held at Scone in 1398, and conferred on David, eldest son and heir of Robert III.; and when David, in 1402, fell a victim to the ambition of his uncle, it was transferred to his brother James, afterwards James I. of Scotland. Renfrew was the chief patrimony of the Stewards of Scotland, to whom it was granted by the sovereign in the 12th century, their principal residence having been in the burgh of Renfrew. In 1404, King Robert III. granted the barony of Renfrew and other portions of the estates of the Stewards to his son and heir, James since which time the eldest

son of the sovereign has borne the title of Baron of Renfrew. By act of the Scottish parliament of 1469, the titles of Prince and High Steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles were vested in the eldest son and heir-apparent of the crown of Scotland for ever. The present Prince of Wales was created Earl of Dublin on September 10, 1849, that dignity being destined to him and his heirs, kings of the United Kingdom of Great Britain and Ireland, for ever.

An annuity of £40,000 was settled on the Prince of Wales by 26 Vict. c. 1. He has besides the revenues of the duchy of Cornwall. These amounted previously to 1840 to between £11,000 and £16,000; since that period, they have risen to £50,000, with every prospect of increasing. Only a small part of this income has been expended since the birth of the present Prince of Wales, the yearly accumulations amounting in November 1862 to upwards of £500,000. An income of £11,000 has been settled by parliament on the Princess of Wales, to be raised to £30,000 in the event of her widowhood. The annuities of the Prince and Princess of Wales are charged on the Consolidated Fund.

The Prince of Wales has a separate household, as also has the Princess of Wales. Act 35 Geo. III. c. 125 makes provision to prevent the accumulation of debt by any future heir-apparent to the crown, and enacts that as soon as he shall have a separate establishment, the treasurer or principal officer shall make a plan of such establishment in distinct departments and classes, with the salaries and payments of each class, and of each individual officer; and the treasurer is made responsible for the punctuality of all payments, and required to submit his accounts to the Lords of the Treasury. The statute of treasons, 25 Edw. III., makes it treason to compass the death of the Prince of Wales, or violate the chastity of his consort.

By a statute of the order of the Garter, of date 1805, the Prince of Wales becomes a Knight of the Garter as soon as he receives that title.

In 1788, on the illness of George III., it was made a question whether the Prince of Wales was not, as heir-apparent, entitled to the regency; the recovery of the king prevented the necessity for a decision, but it is now held that he has no such right.

The arms of the Prince of Wales are those of the sovereign, differenced by a label of three points argent, and the present Prince of Wales bears *en surout* the escutcheon of the house of Saxony. The supporters and crest are the same as those of royalty. The ancient coronet of the Princes of Wales was a circle of gold set round with four crosses patée, and as many fleurs-de-lis alternately. Since the Restoration, it has been closed with one arch only, adorned with pearls, surmounted by a mound and cross, and furnished with a cap trimmed with ermine, like that of the sovereign. The Prince of Wales has further a distinguishing badge, composed of a plume of three white ostrich feathers, encircled by an ancient coronet of a Prince of Wales, and accompanied by the motto 'Ich dien' (I serve). This device is said by a tradition, on which considerable doubts have been thrown, to have been first assumed by the Black Prince after the battle of Crécy, in 1346, when he took such a plume from John, king of Bohemia, whom he had slain with his own hand. The motto has been supposed to allude to the fact that the king of Bohemia served, or was stipendiary to the French king in his wars.

PRINCE OF WALES ISLAND, or PU'LO PINA'NG (Betel Nut Island), an important British

nice distinctions that exist in the law on this subject as to the mutual rights and liabilities of the parties are too numerous to be here noticed.

PRINCIPAL AND SURETY. See **SURETY**.

PRINCIPATO, CITRA and ULTRA, formerly the name of two provinces of the kingdom of Naples. *Principato Citra*, now forming the province of Salerno in the reorganised kingdom of Italy, is a maritime province, bounded on the S.W. by the Mediterranean, and on the N. by the province of *Principato Ultra*, now called Avellino. The united area of the two provinces is 3405 square miles; pop. 883,877. Principal towns in Principato Citra are Salerno (from which it derives its present name), Sarno, and Pagani; in Principato Ultra, Avellino (from which it takes its present name), Ariano, and Cervinara.

PRINTERS, LAW AS TO. There are various restrictions on the sale and use of printing-presses, which have been imposed in consequence of the extended and secret influence often exercised by them; and the law of treason and libel is intimately associated with the press. By an act of 39 Geo. III. c. 79 (amended by 51 Geo. III. c. 65, and 2 and 3 Vict. c. 12), entitled an act for suppressing seditious and treasonable practices, reciting the mischief produced by the publication of irreligious, treasonable, and seditious libels, and the difficulty of tracing the authors, it is enacted that every person having a printing-press, or types for printing, shall give notice thereof to the clerk of the peace where the same is intended to be used, and shall obtain a certificate of registration, otherwise he is liable to a penalty of £20. But the Queen's printers for England and Scotland, and the university presses of Oxford and Cambridge, are excepted. So letter-founders and makers of types must register themselves under a like penalty; and they must keep an account of all the persons to whom types and presses are sold, which account may be inspected by a justice of the peace. So printers must keep a copy of every paper they print for hire or reward, and shall endorse thereon the name of the person employing them to do so, under a penalty of £20. Every printer who shall print a book or paper without having the printer's name and address on the first or last leaf thereof, shall, by the act 2 and 3 Vict. c. 12, s. 2, forfeit £5 for every copy printed; but the only person who can sue for or enforce this penalty is the Attorney or Solicitor General of England, or the Lord Advocate of Scotland. But for the previous penalties, any informer may sue, and the justices may mitigate the penalties to £5. It follows from these enactments that a printer cannot recover his expenses for labour and materials in printing a work, unless he has complied with the statutory requirements. On a recent occasion, in which a printer in England who sued for his account was met with a defence founded on these statutes, it was discovered by the London printers that few of them had registered themselves, and accordingly they took occasion to repair the error. With regard to the printing trade, many customs prevail which do not differ in point of law from the customs affecting other trades, it being the rule that customs of a peculiar trade are binding unless specially excluded. As to obscene prints, see **OBSCENE**.

PRINTING is the art of producing impressions, from characters or figures, on paper or any other substance. There are several distinct branches of this important art—as the printing of books with movable types, the printing of engraved copper and steel plates (see **ENGRAVING**), and the taking of impressions from stone, called **Lithography** (q. v.). We have now to describe the art of printing books

or sheets with movable types, generally called *letter-press printing*, and which may undoubtedly be esteemed the greatest of all human inventions.

The art of printing is of comparatively modern origin, only 400 years having elapsed since the first book was issued from the press; yet we have proofs that the principles upon which it was ultimately developed existed among the ancient Assyrian nations. Entire and undecayed bricks of the famed city and tower of Babylon have been found stamped with various symbolical figures and hieroglyphic characters. In this, however, as in every similar relic of antiquity, the object which stamped the figures was in one block or piece, and therefore could be employed only for one distinct subject. This, though a kind of printing, was totally useless for the propagation of literature, on account both of its expensiveness and tediousness. The Chinese are the only existing people who still pursue this rude mode of printing by stamping paper with blocks of wood. The work which they intend to be printed is, in the first place, carefully written upon sheets of thin transparent paper; each of these sheets is glued, with the face downwards, upon a thin tablet of hard wood; and the engraver then, with proper instruments, cuts away the wood in all those parts on which nothing is traced; thus leaving the transcribed characters in *relief*, and ready for printing. In this way, as many tablets are necessary as there are written pages. No press is used; but when the ink is laid on, and the paper carefully placed above it, a brush is passed over with the proper degree of pressure. A similar kind of printing by blocks, for the production of playing-cards and rude pictures of scriptural subjects, was in use in Europe towards the end of the 14th century. But in all this there was little merit. The great discovery was that of forming every letter or character of the alphabet separately, so as to be capable of rearrangement, and forming in succession the pages of a work, thereby avoiding the interminable labour of cutting new blocks of types for every page. The credit of discovering this simple yet marvellous art is contested by the Dutch in favour of Laurence Coster (q. v.), between 1420 and 1426; and by the Germans, on behalf of Johann Gansfleisch of the Gutenberg (q. v.) family, about 1438. In all probability, the discovery was made almost simultaneously—such a theory being consistent with the general social progress at the period, and the secrecy which both inventors at first maintained respecting their art. The types first employed were of wood; but soon the practice of casting them in metal was introduced. See **TYPES**. The earliest of these metal types resembled the black letter in use by transcribers, and one great aim of the first printers was to produce books which should closely resemble the works in manuscript hitherto in use. Between 1450 and 1455, Gutenberg succeeded in printing a Bible, copies of which are now exceedingly rare and valuable. It is in quarto size, double columns, the initial letters of the chapters being executed with the pen, in colours. Besides this Bible, some other specimens of the work of Gutenberg, the produce of his press at Mayence, have been discovered. The Dutch, at Haarlem, preserve and shew with reverential care similar specimens of early printing by Coster. Mayence, Strasburg, and Haarlem were indisputably the places where printing was executed before the art was extended to Rome, Venice, Florence, Milan, Paris, Tours, and other continental cities. Previous to 1471, it had reached these and various other places; and about the same year, Caxton (q. v.) introduced the art into England, by setting up a press in Westminster Abbey.

powerful command which the leverage enables the workman to exercise, is favourable to delicacy and exactness of printing—his arm feeling, as it were,

are required; also where machinery is unattainable; but in general circumstances, and more particularly to meet the demand for popular reading, printing is now executed by one or other of the varieties of cylinder-presses, moved by steam-power. Attempts have indeed been made to introduce flat-pressure machines, by which as many as 700 sides can be printed per hour; but these, though possessing the advantage of superseding severe bodily labour, and demanding only the services of a boy to lay on, and another to take off the sheets, have never become common. We offer a representation of a machine of this kind, made by J. Brown & Co., engineers, Kirkcaldy. More success, as regards flat-pressure machines, has been attained in the United States, where much fine work is provided by a clever adaptation of this kind, particularly in New York, Boston, and Philadelphia. No flat pressure, however, can compete, in point of speed, with the pressure which is communicated by revolving iron cylinders.

Cylinder-printing is the great modern fact in the history of the art, progress in which department has been facilitated by the invention of inking rollers made of a certain composition, to supersede the old process of inking by stuffed balls (see *ROLLERS*). In 1790, Mr Nicholson, the editor of the *Philosophical Journal*, procured a patent for certain improvements in printing, which patent embodies almost every principle since so successfully applied to printing-machines; and although he did not carry his views into practical effect, little has been left for subsequent engineers to do, but to apply, in the most judicious manner, the principles he laid down in his patent. Whether Mr Nicholson's ideas were known to Mr König, a German, is now uncertain; but to him is due the distinguished merit of carrying steam-printing first into effect. Arriving in London about 1804, he first projected improvements on the common press; but after a while, he turned his attention to cylinder-printing. The first result of his experiments was a small machine, in which the two leading features of Nicholson's invention were embraced (the cylinders and the inking-rollers), which he exhibited to Mr Walter, proprietor of the *Times* newspaper; and on shewing what further improvements were contemplated, an agreement was entered into for the erection of two machines for printing that journal. Accordingly, on the 28th of November 1814, the public were apprised that the number of the *Times* of that date was the first ever printed by machinery, steam-propelled. At this period, but few persons knew of any attempts going on for the attainment of this object; whilst among those connected with printing, it had often been talked of, but treated as chimerical.

After the utility of cylindrical printing had been thus proved, it was thought highly desirable that the principle should be applied to printing fine book-work, where accurate register is indispensable. This was, to a certain extent, attained by using two large cylinders, the sheet of paper being conveyed from the bottom of the first cylinder (where it had received the first impression) by means of tapes, leading in a diagonal direction to the top of the second cylinder, round which the sheet was carried till the second side was printed. The first machine of this description was erected at Mr Bensley's office, where it continued at work for some years, till more modern machines superseded it.

In the course of 1818, Messrs Applegath and Cowper took out a patent for improvements in cylindrical printing machinery. The chief improvements were, the application of two drums placed betwixt the cylinders to insure accuracy in the

Fig. 2.—Columbian Press.

through the series of levers to the very face of the types. In the present day, the old wooden press of Blaeu is entirely discarded from use.

To secure good printing, the following points are essential. 1. The types, carefully set, fixed with precision in forms, rendered level all over, so that all parts may be pressed alike, and the whole properly cleaned by a wash of potash lye. 2. A uniform inking of the surface, to give uniformity of colour. 3. The paper damped equably, neither too much nor too little, so as to take an impression easily and evenly. 4. An equable, firm, and smart pressure, and with that degree of steadiness in the mechanism that the sheet shall touch and leave the types without shaking and blurring. 5. Care in adjusting the pointers (or gauge), so that perfect register may be secured in printing the second side. 6. Such frequency in changing *fly* or under-sheets on the tympan, that the first side shall not get dirtied by off-setting when printing the second side. 7. The laying of small patches on the tympan, where, from any inequality, it seems necessary to bring up the pressing surface to a thorough equality. A regard to all these circumstances constitutes the duty of a pressman. Bad printing is usually a result of old and worn types, want of proper cleaning, and an inferior kind of ink.

Printing by hand-presses of an improved kind con-

Fig. 3.—Flat-pressure Machine.

tinues to be used in the case of limited impressions, or where extra care and elegance in typography

circulation, that none of the ordinary processes, including that just referred to, was at all adequate for the work required. Recourse had to be made to an entirely new method of printing, the invention of which is due to Richard M. Hoe of New York.

Hoe's process consists in placing the types on a horizontal cylinder, revolving on its axis, against which the sheets are pressed by exterior and smaller cylinders. A similar process, by means of an upright cylinder, had been employed by Mr Applegath for printing the *Times* in 1848; but the expense involved in its construction and working prevented it coming into general use. Hoe's process was therefore the first successful attempt to print on this singularly ingenious and effective principle. As types must necessarily stand on a flat surface, in order to be held together and properly printed, it will seem incomprehensible how they should be built up on the exterior of an iron drum, and there yield legible impressions. Yet, this is done by Hoe's process. The pages of type are arranged in segments of a circle, each segment forming a frame that can be fixed on the cylinder. These frames are technically called *turtles*. Each column of type stands on a level strip of the turtle, while between the columns the brass rules for printing the lines are of a

bevelled shape—the bevel corresponding to the convexity of the turtle; so that by means of this bevelling, the form of type is susceptible of being tightened up and made ready for press. The forms occupy only a portion of the main cylinder, the remainder affording space for the inking apparatus. The smaller surrounding cylinders for effecting the pressure are arranged in a frame-work, in connection with slopes, by which the sheets are fed in blank, and come out printed. The size of the main cylinder, the number of exterior cylinders, and the rate of speed at which the whole machine is kept working, determine the number of impressions printed per hour. Such is the method of working Hoe's rotary machines, which, as wanted, are made with 2, 4, 6, 8, or 10 subsidiary cylinders; those of the largest dimensions being now employed in printing the daily newspapers in New York. The first introduced into Europe (with the exception of one made for the Paris newspaper, *La Patrie*, in 1848) was one with six cylinders for printing *Lloyd's Weekly Newspaper* in London, in 1857. Upwards of forty of these machines, of different sizes, are now in operation in London, Manchester, Liverpool, Leeds, Birmingham, Edinburgh, Glasgow, and other cities in Great Britain, where cheap daily

Fig. 5.—Hoe's Machine.

newspapers are produced. Some idea of the process of working may be obtained from the annexed cut, representing a rotary machine with six cylinders, which is employed, along with two of larger dimensions (viz., one with 8, and another with 10 cylinders), in printing the *Manchester Examiner and Times*. The working of the six-cylinder machine is thus described: 'The large cylinder being put in motion, the type imbedded in it is carried, successively, to the six impression-cylinders, which are placed horizontally to the large one, and arranged at proper distances around it. These subsidiary cylinders give the impression to six sheets of paper introduced, one at each cylinder. For each impression-cylinder there are two inking-rollers, which revolve on the distributing surface, and take up a supply of ink, and, at the proper moment, pass over the type, giving it the requisite amount of ink, after which they again fall to the distributing surface. Six persons are required to feed in the sheets, which, after receiving the impression, are carried out, by means of tapes, to the end of the machine, and laid regularly in heaps by self-acting flyers. In order to produce 12,240 impressions in

one hour, each feeder must lay in sheets at the rate of 34 per minute, or 2040 per hour. In each revolution of the large cylinder, therefore, six sheets receive each its impression; and as it moves, say, at the rate of 34 revolutions in a minute, 204 impressions are necessarily produced, giving in 60 minutes, or one hour, 12,240 impressions. In the 8 and 10 cylinder machines, the number of impressions produced per hour would be, respectively, 16,320, and 20,400; but the larger machines are not run at so great a speed as 34 revolutions per minute, and the actual number produced is, therefore, rather less. The productive power of the machine is only limited by the skill and dexterity of the feeders or layers-on. In the *New York Herald* printing-office, the manipulative power of the feeders has been so much increased by practice, that 2500 is by no means an unusual number of sheets to be laid on by each workman in an hour. Applying this to the six-cylinder machine, and supposing the main cylinder to revolve at the rate of 42 revolutions per minute, with six skilful feeders, each capable of laying on 42 sheets in a minute, it follows that 252 impressions would be produced;

of places and pensions. His poems, which comprise odes, songs, epistles, epigrams, and tales, are not much read. He has no fire, no enthusiasm, but everything is neat, pointed, well turned; and his lighter pieces are graceful and witty. If there is little inspiration in his verse, there are the polish and felicity of a scholar and man of society.

PRISCIAN (Lat. *Priscianus*), surnamed **CÆSARIENSIS**, either because he was born or educated in the town of Cæsarea, is perhaps, in point of reputation, the first of Latin grammarians, though one of the last in point of time. He belongs to the middle of the 5th c., if he is not even considerably later, for he is mentioned by Paulus Diaconus as a contemporary of Cassiodorus (468—562 A.D.). He taught Latin at Constantinople, probably to the imperial court, for he enjoyed a government salary. The work which has mainly preserved his name is his *Commentariorum Grammaticorum Libri XVIII.*, dedicated to his patron the consul Julianus. The first 16 books treat of the different parts of speech as conceived by the ancients; the remaining two are devoted to syntax, and in one MS. bear the separate title of *De Constructione libri duo*. P.'s Commentary is, for the time, a solid and comprehensive work, the production of a man of great learning and good sense, and is enriched with quotations from many Greek and Latin authors no longer extant. The epitome executed by the German bishop, Rabanus Maurus (flor. in the 9th c.), was very popular in the middle ages. Besides the Commentary, P. wrote six smaller grammatical treatises, and two hexameter poems of the didactic sort, *De Laude Imperatoris Anastasii*, and a free translation of the *Periegesis* of Dionysius. The first edition of P. appeared at Venice (1470); the best is that by Krehl (2 vols., Leip. 1819—1820).—The phrase, 'to break the head of Priscian,' means to grossly violate the rules of grammar.

PRISCILLIAN, the author, or rather the chief propagator in Spain, during the latter part of the 4th c., of the doctrines professed by the sect known from his name as **PRISCILLIANISTS**. The first seed of their doctrines is said to have been carried into Spain by a Memphian named Marcua. P. was a man of noble birth; and by his eloquence and ascetic life obtained so much consideration, that a numerous party, including some priests, and at least two bishops, attached themselves to his school. His doctrine was substantially that of the Manichæans (q. v.). He taught expressly the *Dualism* and the *Docetism* of that sect, and it is equally certain that he adopted the moral consequences as to marriage, &c., by which they had rendered themselves obnoxious even to the civil authorities in the East and Africa. He was warmly opposed by two bishops, Idacius and Ithacius; and the council of Cæsar-Augusta (Saraçossa) having in the year 380 condemned his doctrines, a decree for his banishment was issued in the same year. He not only obtained, however, a reversal of this decree, but succeeded in effecting the banishment of his chief opponent, Ithacius. By an appeal to the usurper Maximus at Treves, Ithacius caused P. and several of his followers to be brought to trial, and put to death, in 385; a proceeding which was regarded with so much abhorrence by St Martin of Tours, St Ambrose, and other bishops, that they separated from the communion of Ithacius. The sect did not die out with its founder, though there was a considerable reaction against it at the close of the 4th c.; and at all times through the mediæval period we find its traces under various names and forms, especially in the north of Spain, in Languedoc, and in Northern Italy.

PRISM, in Geometry, a solid figure which can

be most easily conceived of if we imagine a number of plane figures (triangles, quadrilaterals, &c.) exactly similar in form and size to be cut out of paper or any thin plate, and piled one above the other, and then the whole pile to become one body. It will thus be seen that the top and bottom of the prism are similar, equal, and parallel to each other, and that the sides are plane figures, rectangular if the prism be 'right' (i. e., if in the above illustration the pile of plane figures be built up perpendicularly), and rhomboidal if the prism be 'oblique' (i. e., if the pile slope to one side); but under all circumstances the sides of a prism must be parallelograms. The top and bottom faces may be either triangles, squares, parallelograms, or quadrilaterals of any sort, or figures of 5, 6, 7, &c. sides, provided only both are alike; and the number of sides in the plane figure which forms the top or bottom, of course determines the number of faces of the prism; thus, in a triangular prism, there are 5 faces in all (3 sides and 2 ends); in a quadrangular prism, 6 faces (4 sides and 2 ends), &c. If two prisms, one being 'right,' and the other 'oblique,' have their bases of equal area, and be of the same vertical height, their solid content is the same, and is found by multiplying the area of the base by the vertical height. The Parallelepiped (q. v.) is a quadrangular prism, and the cube is a particular case of the parallelepiped.—**PRISM**, in Optics, is a triangular prism of glass or other transparent substance, its two ends being isosceles triangles, and having most frequently a very acute vertical angle, which gives the prism the appearance of a long wedge. The prism is a most important instrument in experiments on the refraction of light, and, in the hands of the most eminent optical philosophers, has been the means of largely adding to the science of optics. See **REFRACTION**.

PRISON DISCIPLINE means the method in which criminals, or other persons subjected to imprisonment are managed. In this, which is its original sense, prison discipline, as actually practised, may be good or bad in the estimation of the person speaking of it. Of late, however, the term has obtained a new meaning, having been used to express not merely the practice of ruling prisons, but the science of properly ruling them. It has gone even further, and sometimes has been used to express the principles of penal administration, or the philosophy and practice of punishment. This has arisen from the circumstance, that gradually other punishments have been dropped in this country, and detention within edifices and the grounds attached to them has become almost the only method of punishment for crimes. Torture, exposure in the pillory, and other like dedications of the offender to public vengeance, have been long abandoned as barbarous. Death-punishment has been much narrowed in its application; and transportation, apart from any question as to its effectiveness, has been rendered impracticable, except within a very narrow compass. We get nothing from the practice of the times anterior to Christianity, nor yet from that of the middle ages, to help us in estimating modern systems of prison discipline. They are a development of civilisation; and, contradictory as it may seem to say so, of personal liberty. The institution of slavery renders any such system unnecessary. It removes the function of punishing ordinary criminals from the public administration of the affairs of a state, and places it in private hands. Hence, we have no criminal law, properly speaking, coming down to us from antiquity. The *corpus juris*, so full of minute regulations in all matters of civic right, has very little criminal law, because the criminals became slaves,

'the large' or 'wide'—the legend of P. itself seems to record some historical fact regarding the civilising influences exerted by a great king of Hindu antiquity.

PRIVATE, the title applied in the British army to a common soldier of the cavalry and infantry; the corresponding rank in the artillery being gunner or driver, and in the engineers, the sapper. The pay of a private is one shilling a day in the infantry, and 1s. 3d. in the cavalry—exclusive, in each case, of one penny a day for beer-money. A private in the cavalry is sometimes called a trooper.

PRIVATEER, a ship owned by a private individual, which, under government permission, expressed by a Letter of Marque (q. v.), makes war upon the shipping of a hostile power. To make war upon an enemy without this commission, or upon the shipping of a nation not specified in it, is piracy. Privateering was abolished by mutual agreement among European nations by the Treaty of Paris in 1856. It is doubtful, however, how far that abolition would stand in a general war, for privateering is the natural resource of a nation whose regular navy is too weak to make head against the maritime power of the enemy, especially when the latter offers the temptation of a wealthy commerce.

PRIVET (*Ligustrum*), a genus of plants of the natural order *Oleaceæ*, containing a number of species of shrubs and small trees with opposite leaves, which are simple and entire at the margin; the flowers small, white, and in terminal panicles; the calyx slightly 4-toothed; the corolla funnel-shaped and 4-cleft; the stamens two, projecting beyond the tube of the corolla; the berries 2-celled. **COMMON P.** (*L. vulgare*) is a shrub growing in bushy places and about the borders of woods in the middle and south of Europe, and in some parts of Britain, now also naturalised in some parts of North America. It has half-evergreen, smooth, lanceolate leaves; and berries about the size of peas, black, rarely white, yellow, or green. The flowers have a strong and sweetish smell; the leaves are mildly astringent, and were formerly used in medicine; the berries, which hang on the shrub during winter, have a disagreeable taste, but serve as food for many kinds of birds; they are used for dyeing red, and with various additions, green, blue, and black. A rose-coloured pigment obtained from them is used for colouring maps. The wood is hard, and is used by turners, and by shoemakers for making wooden pegs. P., although not spiny, is much used for hedges, often mixed with some spiny shrub, or with beech. It bears clipping well, and grows well in the smoke of towns, also under the shade of trees. —A number of species of P. are natives of different parts of the East, and some of them have begun to be introduced into shrubberies in Britain.—All kinds of P. grow readily from cuttings.

PRIVILEGE (Lat. *privilegium*, from *privata lex*, a private law), a special ordinance or regulation, in virtue of which an individual or a class enjoys certain immunities or rights from or beyond the common provisions of the general law of the community. It differs from a *dispensation* inasmuch as the latter merely relaxes the existing law for a particular case or cases, while the privilege is a permanent and general right. Of ancient and mediæval legislation, the law of privilege formed an important branch; and, in truth, the condition of the so-called 'privileged classes' was in all respects different, socially, civilly, and even religiously, from that of the non-privileged. In canon law, there were two privileges enjoyed by the clergy, which deserve especial notice, from the

frequency of the historical allusions to them—the 'privilege of the canon' (*privilegium canonis*) and the 'privilege of the forum' (*privilegium fori*). By the former, the person of the clergyman, of whatever degree, was protected from violence by the penalty of excommunication against the offender; by the latter—known in England as 'benefit of clergy' (q. v.)—the clergyman was exempted from the ordinary civil tribunals, and could only be tried in the ecclesiastical court. Most of the purely civil privileges are abolished throughout Europe by modern legislation.

PRIVILEGED DEBTS, in the Law of Scotland, such debts as are first paid out of certain funds. Thus, when a man dies, a certain sum is allowed out of his estate for Mournings (q. v.) to the widow and children. In case of bankruptcy, servants' wages are privileged to a certain extent. —**PRIVILEGED DEEDS** are holograph deeds, which are exempted from the statute which requires other deeds to be signed before witnesses.

PRIVY-CHAMBER, **GENTLEMEN OF THE**, officers of the royal household of England, instituted by King Henry VII., to attend on the king and queen at court, and in their progresses, diversions, &c. For a number of years past, no services have been required of these officers, and no salary or fee is attached to the office. There are also four Gentlemen Ushers of the Privy-chamber, who are in regular attendance on the sovereign, waiting in the Presence-chamber, and attending on the royal person; they have the honour of conducting her Majesty, in the absence of the higher officers.

PRIVY-COUNCIL (*consilium regis privatum*), an assembly of advisers on matters of state appointed by the sovereign. The Privy-council of England existed at a very early period in the history of the country. It was in its beginning a small permanent committee, or minor council, selected by the king out of the great council, or parliament; and in its powers were included—what still forms one of its functions—the right to inquire into all offences against the state, and to commit offenders for trial before the proper courts of law. It also frequently assumed the cognizance of questions of private right, a practice against which the statute 16 Charles I. c. 10 was directed, enacting that neither king nor council should have any jurisdiction in matters regarding the estates and liberties of the subject, which should be tried in the ordinary tribunals of the country. The Council in early times consisted of the Chancellor, the Treasurer, the Justices of either bench, the Escheaters, the Serjeants, some of the principal Clerks of the Chancery, and other members nominated by the king, who were generally bishops, earls, and barons. The Star-chamber and Court of Requests were both committees of Privy-council. The number of members, which had originally been 12, was gradually increased; and when the large number had become inconvenient, the sovereign sought the advice of a select body of the more influential among them. Charles II. limited the number of councillors to 30, 15 of whom comprised the chief officers of state and the *ex officio* members, to whom were added 10 peers and 5 commoners named by the sovereign; and it was intended that the Council, thus remodelled, should practically resume its original duties, and have the control of every part of the executive administration. The Court of Privy-council has, however, long ceased to discharge the function of advising the crown on the general affairs of government and state policy; a select number of the body, under the denomination of the Cabinet Council, forming the recognised executive council of the crown. See **MINISTRY**. The

ancient, and was revived by Charles II. in favour of the Earl of Shaftesbury.

Scotland possessed a Privy-council, which was merged in that of England by 6 Anne, c. 6. There is a Privy-council for Ireland, which at present consists of 58 members, who are sworn pursuant to a sign-manual warrant directed to the Lord Lieutenant.

PRIVY-COUNCIL (COMMITTEE OF) ON EDUCATION. Till within the last thirty years, popular or primary education in England was left in the hands of individuals and societies. The only Societies of importance which endeavoured to overtake the enormous educational destitution which prevailed, were the British and Foreign School Society, founded under the patronage of George III.; and the National Society, of more recent date. The first-mentioned Society endeavoured to get rid of all religious difficulties by avoiding the use of catechisms in the school, and confining themselves to the use of the Bible alone. The Church party, however, felt that in accepting for the children of the country a religious training so vague, they were untrue to their principles, and would probably fail to secure for the young any efficient religious instruction at all. Accordingly, the National Society was set on foot as a specially Church institution. The object of both these Societies was, by means of contributions collected from benevolent persons, to aid in the foundation and maintenance of elementary schools throughout England and Wales.

The prevailing destitution was, however, too widespread to be met by voluntary associations, and it consequently became necessary that the State should take some share in the education of the people. Parliamentary grants of small amount were made, which were distributed by the Treasury under regulations issued in 1833, the chief of which was as follows: 'That no application be entertained by the Treasury unless a sum be raised by private contribution equal, at least, to one-half of the total estimated expenditure.' These grants were for the purpose of erecting school-buildings. In 1839, after considerable opposition, it was resolved to increase the parliamentary grant, and to appoint a Committee of Her Majesty's Privy-council to administer it. On the 3d June 1839, an order of Council laid down, that the grants of previous years not yet appropriated, as well as the grant for the current year, should be expended for the erection of schools, and that £10,000 voted for Normal Schools in 1835 should be given in equal proportions to the British and Foreign and the National Societies. The Privy-council Committee did not at first contemplate aiding any schools but those in connection with the two Societies which we have just named; but in September of 1839, they resolved to aid other schools, where special circumstances prevented their affiliation to the Societies. In the course of a year or two it came practically to this, that *all schools* were aided in *which the Bible was daily read from the authorised version*.

The various religious denominations, under the influence, partly, of the strong pecuniary inducement held out by the Committee of Council, now began to exert themselves to erect schools, and to claim state aid. The Committee of Council, seeing the large probable increase in the number of schools requiring to be maintained partially out of the state funds, had their attention specially directed to the principles of their administration, and the conditions on which alone aid was to be granted. The first measure of importance was the appointment of inspectors of schools. These were appointed by Her Majesty; but the Church

of England was permitted to exercise a veto on those nominated for the inspection of Church schools, and the dissenting education committees were allowed a similar privilege with reference to those nominated for dissenting schools. No school was to be admitted to government aid in any form which did not declare its willingness to submit to inspection. The next measure of importance was the determining of the conditions on which aid should be given, first, for the erection, and, secondly, for the maintenance of schools. Grants for the former purpose were given in proportion to the number of children to be educated and the amount of money raised by private contribution.

In 1846, the first step seems to have been made towards making grants for the *maintenance* of schools. It was resolved to apprentice promising boys to their teachers—these boys to give assistance in the school-work, and to be paid annual stipends by government. The masters were to give special instruction to these boys in terms of a programme drawn up by the Committee of Council, and they were to be paid a small sum per annum for discharging this duty. At the same time, it was resolved to distribute gratuities annually among deserving teachers.

The course of instruction for these apprentices, who were to be designated pupil-teachers, extended over five years, and their remuneration was arranged as follows: First year, £10; second, £12, 10s.; third, £15; fourth, £17, 10s.; fifth, £20. To schools taught by the humbler class of teachers, stipendiary monitors were allowed at a smaller rate of stipend.

In contemplation of the close of the apprenticeship of pupil-teachers, it was further resolved to grant them a scholarship or bursary, to enable them to pursue their studies at one of the numerous male and female normal schools which had come into existence; and at the conclusion of their training, to allow a grant of money to the normal school to which they had resorted. The Queen's Scholarship, as the bursary was called, was fixed at £20; and the grants to the normal school at £20, £25, and £30, according as they had trained the student for one, two, or three years—two-thirds of these sums being allowed in the case of female students. It was further necessary to contemplate the completion of the normal-school training, and to endeavour to secure for the public service the well-trained teachers who had been educated at the public expense. Accordingly, it was resolved to grant to teachers sums ranging from £15 to £30 per annum (and two-thirds of these sums in the case of females), provided the school-buildings in which they taught, and the character of their teaching, were satisfactory to Her Majesty's inspectors. A condition, afterwards added, was, that the teacher should receive from local sources, including school-fees, not less than twice the amount paid by government, of which one-half should be from voluntary subscriptions. The amount which the teacher might claim, besides being payable only on the conditions stated above, was made partially dependent on the grade of certificate obtained at the normal school. The certificate was, and still continues to be, granted on the student's passing a satisfactory examination in all the subjects taught in elementary schools, in addition to physical geography, and either mathematics or Latin.

These are the principles of administration which have continued to regulate the action of the Privy-council, both as to the class of schools aided and the manner of aiding them, up to the present date. The consequence has been an astonishingly rapid increase in the number of primary schools and

natural law, one would suppose that the tribunals of the captor's country are no more the rightful exclusive judges of captures in war, made on the high seas from under the neutral flag, than are the tribunals of the neutral country. Nevertheless, such is the rule of international law, which vests this jurisdiction in the prize-court. In Britain, the court is created by commission under the Great Seal, and the judge of the Admiralty Court is usually appointed. Lord Stowell was the judge during the French war, and, during the time he sat as judge, delivered many important judgments in this difficult branch of the law.

PROA, commonly known as the 'flying proa,' is a peculiarly-shaped canoe in use by the natives of the Eastern Archipelago, and especially by the Ladrone pirates. It is about 30 feet in length by 3 in width, and has the stem and stern equally sharp, so as to sail backward or forward without being turned round. One side is flat, and in a

Proa.

straight line with the stem and stern; the other side is rounded, as in ordinary boats. This peculiar formation would make it liable to be easily upset, were it not for a framework which projects to windward, supporting a weight which counterbalances the pressure of the wind on the sail. The sail resembles the ordinary lug-sail, and is formed of mat. Slight variations from this form are found, but the principle of construction is the same.

PROBABILISM (Lat. *probabilismus*, a barbarous technical word, from *probabilis*, probable), in Roman Catholic theology, means the doctrine regarding the use of so-called 'probable opinions' in guiding the conscience as to the lawfulness or unlawfulness of any particular action. The word came prominently into discussion in the 17th c., and seems now fully accepted as a technical name. As the ground of the doctrine, it is assumed that, in human actions, absolute certainty is not always attainable as to their lawfulness or unlawfulness. Short of this certainty, the intellect passes through the stages of 'doubt' and of 'probability.' In the former, it is swayed between conflicting views, so as to be unable to decide, or even to approach towards deciding, what is true. In the latter, although there is a conflict of views, yet the reasons in their favour are not so equal that the intellect cannot see preponderating motives in favour of the truth of one or of the other. Moreover, in the conflict of views, another element will arise, as to their comparative 'safety,' that is,

the greater or less danger of moral culpability which they involve; and this greater or less moral 'safety' of a view may, or may not, coincide with its greater or less 'probability.' The doctrine of 'probabilism' is founded upon these distinctions; and it presents itself in four different schools, all of which agree in professing that it is lawful, in certain cases, to act upon opinions which are merely 'probable.' Opposed to all these four, is the school of *Anti-probabilism*, which rejects altogether the use of probable opinions, and requires that an opinion shall be absolutely morally certain, in order that it may be lawful to act upon it. The four schools of probabilism are called: *Probabilism Simple*, *Equiprobabilism*, *Probabiliorism* (from *probabilior*, more probable), and *Tutorism* (from *tutor*, more safe). The first holds that it is lawful to act upon any probable opinion, no matter how slight its probability. The second requires that the opinion shall be 'solidly probable,' but holds that, provided it be really probable, it is lawful to act upon it, even though the conflicting opinion should be equally probable. The third, in the conflict of probable opinions, will only permit us to act on the more probable of the two; but permits this even when the less probable adverse opinion is the 'more safe.' The fourth requires that in all cases the more safe opinion shall be followed, even when the less safe opinion is much the more probable. It is commonly said that the system of probabilism is modern; but this is only true of the discussions regarding it, for the doctrine itself, in some of its forms, is as old as the study of ethics, even considered as a moral science. The disputes regarding it arose with the science of casuistry, when men, in the 16th and 17th centuries, began to reduce morals to a system. It formed a leading subject of the controversy between the Jesuits and the Jansenists, although it is a great, while it is a very common, mistake to suppose that all the Jesuits were probabilists, and that all the Jansenists were opposed thereto. Very few Jesuits, indeed, were of the school which is chiefly assailed in the *Provincial Letters* (see PASCAL), that of Probabilism Simple. Without entering into the history of this very curious controversy, it will be enough to say that the Roman Church, while condemning the two extremes—the extreme of anti-probabilism, which excludes all use even of the most probable opinions, and the lax extreme of simple probabilism, which accepts even the slightest probability as sufficient—has left the intermediate opinions for free discussion. The great modern master on the subject is St Alfonso de Liguori, whose system may be described as a kind of practical probabiliorism, in which, by the use of what are called reflex principles, an opinion which *objectively* is but probable, is made *subjectively* the basis of a certain and safe practical judgment. There can be no doubt that the system of probabilism has been pushed by some individual divines to scandalous extremes; but it is only just to add that these extremes have been condemned by authority in the Roman Church; and that, on the other hand, the principles of the higher Roman schools of probabilism are substantially the same as those of all moralists, whether of the old or of the new schools of ethics.

Protestants, however, and with them some Roman Catholics, reprobate probabilism in all its schools or forms, as a mere scheme for the delusion of conscience and excuse or justification of immorality. They maintain the Scriptural or Christian rule, and the only rule of true morality, to be that no man is entitled on any account to do that of which he doubts whether it is contrary or agreeable

chance of head followed by tail, in two tosses? The latter question was answered in the *Second Case*, for the chance of H, T was there shewn to be $\frac{1}{4}$. The present event contemplates *either* H, T or T, H—and its probability is therefore $\frac{1}{4} + \frac{1}{4}$, or $\frac{1}{2}$, since each has the separate probability $\frac{1}{4}$. Or we may reason thus: Of the four possible cases of two tosses of a coin, *two* give both head and tail—all *four* are equally probable—hence the probability is 2 in 4, or 1 in 2; i. e., $\frac{1}{2}$.

Fourth Case.—What is the chance of throwing H in two tosses? Remark that this is *not* the same question as, 'What is the chance of H *once only* in two tosses?' The latter question is that of the *Third Case* merely put in a different form. Nor will it do to answer our question thus:

$$\text{Chance of H in first throw} = \frac{1}{2}$$

$$\text{Chance of H in second throw} = \frac{1}{2}$$

$$\text{Therefore chance of H in two throws} = \frac{1}{2} + \frac{1}{2} = 1.$$

For by this reasoning it would appear that we *must* get head once at least in two throws; which is obviously absurd, for we may have T, T.

This very elementary example shews how delicate the reasoning in this subject is, and how liable one is to make (complacently) the most preposterous mistakes.

The error of the above process is introduced by the fact, that we have not considered that *if H be obtained in the first throw, our object is attained, and no second throw is required.* The correct work is this—

$$\text{Chance of H in first throw} = \frac{1}{2}$$

If H come, the game is finished.

Chance of T in the first throw, in which

$$\text{case we must throw again,} = \frac{1}{2} \left\{ \right.$$

$$\text{Subsequent chance of H in second throw} = \frac{1}{2} \left. \right\}$$

Combining these, we have—

$$\text{Chance of H at second throw only} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$\text{Add chance of H at first throw} = \frac{1}{2}$$

$$\text{Sum, or chance of H in two throws} = \frac{3}{4}$$

A simpler method is this. The possible throws, all equally likely, are, as before—

H, H; H, T; T, H; and T, T.

The first three of these satisfy the requirements of the question; i. e., the required event has 3 chances in 4 in its favour, or its probability is $\frac{3}{4}$.

Fifth Case.—The chance of H in any one throw is $\frac{1}{2}$ (by *First Case*). The chance of H, H is $\frac{1}{4}$ (*Second*

Case). Now $\frac{1}{4} = \frac{1}{2} \times \frac{1}{2}$; i. e., the chance of the joint occurrence of two independent events, at least in this simple case, is the product of their separate probabilities. Contrast this with the principle, already several times employed, that the probability of an event which may arise from one of a number of causes (no two of which can coexist), is the sum of the

separate probabilities. Simple proofs of these statements, in all their generality, will now be given, along with various other important propositions.

(A.) If an event may occur in p ways, and fail in q ways—all being equally likely—the probability of its happening in one trial is $\frac{p}{p+q}$, and of its failing,

$$\frac{q}{p+q} \text{—and the odds in its favour are } p:q.$$

The simplest way of conceiving this, and many other hypothetical cases, is to suppose *one* ball to be drawn from a bag which contains a number of balls, differing from each other in colour, or in some other quality not distinguishable by the touch. Suppose the bag to contain p white balls (W), and q black ones (B), and *one* ball to be drawn; what is the chance of its being white?

Here there are p chances in favour of a white ball being drawn, and q chances against it—these being *all equally likely*, or having *equal probabilities*—the chance of W is therefore p in $p+q$; i. e., is expressed by the fraction,

$$\frac{p}{p+q}.$$

The chance against W is q in $p+q$, or

$$\frac{q}{p+q}.$$

And the sum of these fractions is 1, or certainly, as it ought to be—for the ball drawn *must* be either W, or not W.

(B.) If an event may occur in p ways, and fail in q ways, all being equally likely—what are the chances of (a) its happening twice, (b) its happening the first, and failing the second, (c) its failing the first time, and happening the second, and (d) its failing twice, in two trials?

Taking the illustration in (A) above, we see that there are p independent ways of succeeding in the first case, and p in the second; hence, there are $p \times p$, or p^2 independent ways of *succeeding twice*. For any one of the first p may occur along with any one of the second. But the whole possible number of ways of experimenting twice is $(p+q)(p+q)$, or $(p+q)^2$; hence, the

$$\text{Chance of (a) i. e. succeeding twice, is } \frac{p^2}{(p+q)^2}$$

$$\text{Similarly, chance of (b) is } \frac{pq}{(p+q)^2}$$

$$\text{" " " (c) is } \frac{qp}{(p+q)^2}$$

$$\text{" " " (d) is } \frac{q^2}{(p+q)^2}$$

The sum of these is $\frac{p^2 + 2pq + q^2}{(p+q)^2} = 1$, as it ought.

(C.) An attentive consideration of (B) shews us that when we have the independent probabilities of two events, the probability that they will jointly occur is the *product* of their separate probabilities.

$$\text{Thus, for W, in first trial, chance is } \frac{p}{p+q}$$

$$\text{" " second " " " } \frac{p}{p+q}$$

Whose product is $\frac{p^2}{(p+q)^2}$; the probability of W is each of two successive trials.

$$\text{Again, for W, in the first trial, chance is } \frac{p}{p+q}$$

$$\text{" B " second " " } \frac{q}{p+q}$$

—

W1

be

(D.) This may be generalised as follows—the process will be evident to all who can understand the very elementary algebra employed:

$$\text{Certainty} = 1 = \frac{(p+q)^n}{(p+q)^n} = \frac{p^n + np^{n-1}q + \frac{n \cdot n-1}{1 \cdot 2} p^{n-2} q^2 + \dots + q^n}{(p+q)^n}$$

by the Binomial (q. v) Theorem of Newton. Now the parts of this expression—i. e.,

$$\frac{p^n}{(p+q)^n}, \frac{np^{n-1}q}{(p+q)^n}, \dots, \frac{q^n}{(p+q)^n}$$

represent, obviously, the chances of W n times, W $n-1$ times and B once, W $n-2$ times and B twice, B n times, in n trials, where the order of occurrence is not considered.

If the order be considered, the chance of any arrangement, such as WBWBWBW, for instance, is evidently

$$\frac{p \cdot q \cdot p \cdot p \cdot q \cdot q \cdot p \cdot p}{(p+q)^8} = \frac{p^4 q^4}{(p+q)^8}$$

But the chance of 4W and 4B in 8 trials, without respect to order, is as above, the term containing $p^4 q^4$ in the expansion of $(p+q)^8$, divided by $(p+q)^8$ —i. e.,

$$\frac{70 p^4 q^4}{(p+q)^8}$$

To take a simple example: if there be 2W and 1B in a bag, and each ball be replaced immediately after drawing, the chance of W 4 times in succession is $\frac{2^4}{3^4} = \frac{16}{81}$

Of the particular combination WBWB, the chance is $\frac{2 \cdot 1 \cdot 2 \cdot 1}{3^4} = \frac{4}{81}$.

But the chance of W twice and B twice, without respect to order, is $\frac{6 \cdot 2^2 \cdot 1^2}{3^4} = \frac{24}{81}$: the numerator of the fraction being the term of $(2+1)^4$ which contains the product $2^2 \cdot 1^2$.

(E.) From the preceding results it is obvious that the probability of the joint occurrence of any set of independent events is the product of their separate probabilities.

(F.) We may vary the process by supposing that there are several bags, each containing some balls, which may be white or black; but the number in each bag, and the proportion of white to black, being any whatever. One ball only is to be drawn, what is the chance that it is W?

If n be the number of bags, the chance that the ball will be drawn from any particular bag is $\frac{1}{n}$ [see (A)]. And if in that bag there be p of W and q of B, the chance that W will be drawn from it is $\frac{p}{p+q}$ [see (A)].

Hence the chance that W is drawn, and from the particular bag, is,

$$\frac{1}{n} \cdot \frac{p}{p+q} \text{ by (E).}$$

And the whole chance that W is drawn is the sum of all the chances, $\frac{1}{n} \cdot \frac{p}{p+q}$, for each of the bags.

Thus, let there be 5 bags, containing, respectively, WB, WW, BB, WWB, WWW; our chance is

equally likely to be chosen. Then, supposing the first chosen, the chance of W is $\frac{1}{2}$; if the third be chosen, the chance of W is 0, &c. Hence, on the whole, the chance of W is

$$\frac{1}{5} \cdot \frac{1}{2} + \frac{1}{5} \cdot 1 + \frac{1}{5} \cdot 0 + \frac{1}{5} \cdot \frac{2}{3} + \frac{1}{5} \cdot 1 = \frac{19}{30}$$

(G.) Hence, if an event may happen in consequence of any one of a set of causes, such that the action of one excludes that of the others; its probability is the sum of the products formed by multiplying the chance of the action of each cause by the chance that that cause, if operating, will produce the desired event.

We might easily extend this very simple series of results, but our limits restrict us to an attempt to shew more the extent of the subject than the details of its application to any particular set of questions. We therefore reluctantly pass to the consideration of an inverse problem or two.

(H.) An event has occurred, which may have arisen from any one of a set of mutually exclusive causes: to determine the probability that any particular cause was the efficient one—the probability of the event's happening, when any particular one of the causes operates, being known.

As a simple example will shew us how to proceed in the most general case, take the 5 bags of (F) above. The chances of drawing W from them are, in order, $\frac{1}{2}, \frac{2}{3}, 1, 0, \frac{2}{3}$. Suppose W has been drawn, what is the chance that it was drawn from any particular bag? It is obvious that the chance of W having been drawn from any particular bag is proportional to the chance that, if that bag had been selected, W would have been drawn from it. Hence, if p_1, p_2, p_3, p_4, p_5 be the chances that the several bags furnished the W actually drawn, we have

$$p_1 : p_2 : p_3 : p_4 : p_5 :: \frac{1}{2} : \frac{2}{3} : 1 : 0 : \frac{2}{3},$$

with the additional condition, that the ball must have been drawn from one of the bags, and therefore

$$p_1 + p_2 + p_3 + p_4 + p_5 = 1.$$

From these, by elementary algebra, we have

$$p_1 = \frac{3}{19}, p_2 = \frac{6}{19}, p_3 = 0, p_4 = \frac{4}{19}, p_5 = \frac{6}{19}.$$

And a very simple application of algebra will easily conduct us to the general formula for any such case.

(I.) If the nature of a cause is known only by its results, we have an interesting case of simultaneous application of the direct and inverse methods.

Thus, a bag contains 3 balls, each of which may be either black or white. A ball has been drawn from it on two occasions—replacing before drawing—and on each of these occasions the ball was W. What is the chance that a third drawing will give a black ball?

The contents of the bag are obviously one of the following—viz., W,W,W; W,W,B; or W,B,B—since it contains one W at least. Now, if WWW be the contents, the probability of the observed event (two W in succession) is $1 \times 1 = 1$.

$$\text{If W,W,B, } \frac{2}{3} \times \frac{2}{3} = \frac{4}{9}.$$

$$\text{If W,B,B, } \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}.$$

Hence the probabilities that these are, respectively, the contents of the bag are as $1 : \frac{4}{9} : \frac{1}{9}$, or as $9 : 4 : 1$; and are therefore $\frac{9}{14}$, $\frac{4}{14}$, and $\frac{1}{14}$ respectively, since their sum must be 1 or certainty.

Now for the chance of B in the third drawing; if WWW be the contents (of which the chance is $\frac{9}{14}$), the chance of B is 0. Hence we have one part of the chance for B, viz. $\frac{9}{14} \times 0 = 0$. Similarly, the other parts are $\frac{4}{14} \times \frac{1}{3} = \frac{4}{42}$, and $\frac{1}{14} \times \frac{2}{3} = \frac{2}{42}$. The whole chance of B in the third drawing is therefore

$$0 + \frac{4}{42} + \frac{2}{42} = \frac{1}{7}$$

As exercises on the above principles, we will take first a few simple questions from Life Assurance, the subject to which, above all others, the elementary theory of Probability has been of the most indispensable service. We purposely choose the very simplest that the subject can furnish, but they are quite sufficient to shew the great value of the theory.

A Table of Mortality (q. v.) gives the numbers alive at each successive year of their age, out of a given number of children born. If A_n and A_{n+1} be the numbers in the table corresponding to the n^{th} and $n+1^{\text{th}}$ years of age; the inference from the table is, that, of A_n individuals now alive, and of n years of age, A_{n+1} will live one additional year at least. Hence, the chance that any one of them die during the year is

$$\frac{A_n - A_{n+1}}{A_n}$$

Call this $1 - p$, then p is the chance that any one of them will survive the year.

Questions. Of two individuals, one n years old, and the other n_1 , what are the chances that

- Only one lives a year?
- One, at least, lives a year?
- Both do not live a year?

Calling the individuals A and B, the chance of A living out the year is p , and the chance of his dying within the year is $1 - p$. For B these are p_1 and $1 - p_1$. Hence

- A lives and B dies—chance $p(1 - p_1)$.
- B lives and A dies—chance $(1 - p)p_1$.

Hence answer to (a) is $p + p_1 - 2pp_1$.

(b) This includes, in addition to the conditions of (a), the chance that both survive, which is pp_1 .

Hence answer to (b) is $p + p_1 - pp_1$.

(c) In this case the chance that both do live a year is pp_1 . Hence chance of (c) is $1 - pp_1$.

As another very instructive example, let us take the question,

'In how many throws of a die is it even betting that an ace will be thrown?'

This may, of course, be worked directly, proceeding in the following manner:

$$\text{Chance of ace in first throw} = \frac{1}{6}$$

Then, remembering that there is no second throw unless the first fails,

$$\text{Chance of ace in second throw} = \frac{5}{6} \cdot \frac{1}{6}; \text{ and so on.}$$

Hence the odds against ace in 1 throw are 5 : 1.
 " " " 2 throws 25 : 1;
 and so on. But great care is requisite in this mode of working the problem.

The simplest procedure is this:

Chance against ace in 1 throw	$\frac{5}{6}$.
" " " 2 throws	$\frac{25}{36}$.
" " " 3 " "	$\frac{125}{216}$.
" " " 4 " "	$\frac{625}{1296}$.

Hence odds against ace in 1 throw	5 : 1.
" " " 2 throws	25 : 11.
" " " 3 " "	125 : 91.
" " " 4 " "	625 : 671.

That is, the odds are considerably against ace occurring in three throws, being about 11 to 8; while in four they are slightly in its favour, as 29 : 27 nearly. One is sure, therefore, of winning in the long run, if he can get any one to give him repeatedly an even bet against ace appearing in four throws of a die.

It is to be observed that when we say 'in the long run,' we mean that the most likely event may not be that which will happen in the first trial, nor perhaps for many trials (because, unless its probability is 1 or certainty, it is, of course, possible that it may never occur). But what is certain is this, that if a sufficient number of trials be made, we can have any amount of probability (short of certainty) that the ratio of the number of successful trials to the number of failures, will be in the ratio expressed by the odds in favour of success in any one trial.

And this introduces us to another department of the theory of Probabilities, what is called *Expectation*. We begin with a simple case, not involving what is called *Moral Expectation*, to which the next example will be devoted.

Suppose A, B, and C have made a pool, each subscribing £1; and that a game of pure chance (i.e., not dependent on skill) is to be played by them for the £3. What is (previous to play) the value of the expectation of each? By the conditions, all are equally likely to win the pool, hence its contingent value must be the same to each; and, obviously, the sum of these values must represent the whole amount in question. The worth of the expectation of each is therefore £1. That is, if A wishes to retire from the game before it is played out, the fair price which B or C ought to pay him for his share

is simply £1. But this is obviously $\frac{1}{3} \times £3$; i.e.,

the value of the pool multiplied by his chance of getting it. Here we have taken an extremely simple case, because we have not room for the general proof (though it is closely analogous to that just given) that

The value of a contingent gain is the product of the sum to be gained into the chance of winning it.

So far, it has been assumed that the payment of his stake (which may be wholly lost) has not morally affected the position of any of the players; i.e., that the stake is a sum whose loss would in nowise embarrass him. And it is only with such cases that the strict mathematical theory can deal; for we cannot estimate with mathematical accuracy the value of the stake as depending on the fortune (the possessions, not the luck) of the player. The attempts which have been made to supply this apparent deficiency in the theory have, of course, not been very generally accepted. Still there is no doubt that two men of very unequal fortunes are placed in very different circumstances when they have subscribed equal sums to a pool which they have equal chances of gaining. The most commonly

received method of *approximating* to a solution of such a question (for it is obvious that here we have left mathematical certainty behind) is that proposed by Daniel Bernoulli; which is, that the value of a small gain, or the inconvenience of a small loss, is directly proportional to the amount of the gain or loss (which is probably correct), and inversely proportional to the fortune of the person affected (which may be nearly true, except in very extreme cases). The application of this hypothetical principle necessitates, in general, the use of the integral calculus; but, to shew the *mathematical folly* of gambling, we quote one of Bernoulli's results.

A, whose whole fortune is £100, bets £50 even with B on an event of which the chance is $\frac{1}{2}$. What is the moral value of A's fortune after making the bet (and before it is decided)? By applying the above method, he finds it to be £87. Thus A, by making the bet, has depreciated by 13 per cent. the value of his property. This is an extreme case, of course; and the method employed in obtaining the result is questionable; still, it is certain that no legitimate method could shew that A had otherwise than impaired his fortune by entering upon any such transaction. This, of course, is on the supposition that the bet is a *fair* one; if A be a swindler, and get from B more than the proper odds against the event, he may, of course, improve to any extent the value of his fortune. But such would be a question of flats and sharpeners, not a question of probability.

A very excellent example of *moral* as distinguished from *mathematical* probability is furnished by the famous 'St Petersburg Problem.'

A and B play at heads and tails. A is to pay B £2 if H comes at the first throw, £4 if at the second and not before, £8 if at the third and not before; and so on, doubling each time. What should B pay (before the game) for his expectation?

Applying the mathematical method, we see that

$$\text{Chance of H at first throw} = \frac{1}{2};$$

in which case B gets £2, of which the contingent value is $\frac{1}{2} \times £2 = £1$.

Chance of H at second throw, and *not* before = $\frac{1}{4}$;
when B is to get £4, whose value is therefore $\frac{1}{4} \times £4 = £1$.

Chance of H at third throw, and *not* before = $\frac{1}{8}$;
contingent value of B's £8 is therefore $\frac{1}{8} \times £8 = £1$.

And so on, for ever.

Hence B's expectation (mathematical) is £1 + £1 + £1 + &c. for ever, or an infinite sum. Now it is obvious that no man, in his senses, would pay even a moderately large sum for such a chance. Here the *moral* expectation comes into play; but the mathematical solution is perfectly correct, if we interpret it properly. It does not attempt to tell what will be the actual result in any one game—this is pure chance—but it tells us what will be the average to which the results of larger and larger numbers of games must continually tend. In other words, if B had an inexhaustible purse, he might safely pay any amount to A before each game, and be sure of winning in the long run, after an indefinitely great number of games were played. But this, though theoretically exact, is not applicable to mundane gambling—where limited purses and limited time

circumscribe the field requisite for the proper development of the mathematical result.

Before quitting this part of the subject, we may give a couple of instances in which the mathematical theory may be easily tested by any one who has a little leisure. One of these we will develop at length, as a final instance of the simple calculations generally involved.

'To find the chance of throwing any given possible number with two dice.'

As the faces of the dice are numbered from 1 to 6—the smallest throw is 2, and the greatest 12.

In one throw, the chances are—

$$\text{For } 2 = 1 + 1; \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36};$$

the probabilities being *multiplied* (E) because the events are independent. For

$$3 = 1 + 2, \text{ or } 2 + 1; \frac{2}{36};$$

$$4 = 1 + 3, 2 + 2, \text{ or } 3 + 1; \frac{3}{36};$$

$$5 = 1 + 4, 2 + 3, 3 + 2, \text{ or } 4 + 1; \frac{4}{36};$$

$$6 = 1 + 5, 2 + 4, 3 + 3, 4 + 2, \text{ or } 5 + 1; \frac{5}{36};$$

$$7 = 1 + 6, 2 + 5, 3 + 4, 4 + 3, 5 + 2, \text{ or } 6 + 1; \frac{6}{36};$$

Then, in the inverse order—

$$8 = 2 + 6, 3 + 5, 4 + 4, 5 + 3, \text{ or } 6 + 2; \frac{5}{36};$$

and so on—the fact being that if we read the *lower* sides of the dice when the throw is 8, they will give 6, and so on—the sum being always 14.

The mathematical expectation for any one throw is therefore

$$\frac{1}{36} \cdot 2 + \frac{2}{36} \cdot 3 + \frac{3}{36} \cdot 4 + \frac{4}{36} \cdot 5 + \frac{5}{36} \cdot 6 + \frac{6}{36} \cdot 7 \\ + \frac{5}{36} \cdot 8 + \frac{4}{36} \cdot 9 + \frac{3}{36} \cdot 10 + \frac{2}{36} \cdot 11 + \frac{1}{36} \cdot 12$$

In all—

$$\frac{1}{36}(2 + 6 + 12 + 20 + 30 + 42 + 40 + 36 + 30 + 22 + 12); \\ \text{or } \frac{1}{36} \cdot 252 = 7.$$

The meaning of this is, *not* that we shall probably throw seven the first time, nor second, nor perhaps for many throws; but that if we throw a number of times, add the results, and divide by the number of throws, the final result will be more and more nearly equal to seven, the greater be the whole number of throws. It is very instructive to make the experiment, say on 100 throws of two dice, as in backgammon. If the mathematical result be not closely verified by such a trial, the dice are loaded; or, at least, are ill-made.

Another illustration, and a very excellent one, is furnished by the following theorem.

If the floor be ruled with equidistant parallel lines, and a straight rod, whose length is equal to the distance between any two contiguous lines, be dropped upon it at random, the chance of its falling

on one of the lines is $\frac{2}{\pi}$, where π is the ratio of the circumference of a circle to its diameter (see QUADRATURE OF THE CIRCLE). The deduction of this result from the theory of Probabilities requires the use of the integral calculus, and cannot be given here; but we may put the above theorem to the test of practice in the following way. Let the rod

be tossed a number of times, then the greater this number, the more nearly shall we have

Twice number of throws
Number of times the rod falls on a line = π
= 3.14159, &c.;

and therefore, by simply continuing this process long enough, we may obtain as accurate a value as we choose of the ratio of the circumference to the diameter of a circle.

To shew how the theory of Probabilities would tend, if generally known, to the discouragement of gambling, would require a treatise—as every species of game would have to be treated—we shall therefore only take one case, about as bad a one as can be. This is when a man makes a 'book' on a horse-race, so as to 'stand to win,' whatever be the result of the race. This is, of course, immoral; for, as it can make no matter who accepts his bets, suppose them all taken by one individual. The latter must therefore have been 'done' into a complex transaction by which he is *certain to lose*. The method of making such a 'book' is simple enough; it consists mainly in betting *against* each horse. Thus, if three horses, A, B, C, are to start, and he can get the following bets taken—

£4 : £3 against A,
£5 : £4 " B,
£6 : £5 " C;

his book stands thus :

If A win, he wins £4 + £5 - £4 or £5.
" B " " £5 + £3 - £5, £3.
" C " " £4 + £3 - £6, £1.

Now, to examine this case, suppose the *correct* odds to have been laid against A and B, what ought in fairness to be the odds as regards C?

Chance of A winning is	.	.	$\frac{3}{7}$
" B " " "	.	.	$\frac{4}{9}$
Chance of A or B winning =	$\frac{3}{7} + \frac{4}{9}$	=	$\frac{55}{63}$

Hence, chance of C winning = $\frac{8}{63}$; and therefore the legitimate odds against C are 55 to 8, whereas our betting-man has got a *fool* to accept 6 to 5.

The true cause of the detestation which attaches to gambling, is not so much the ruin, insanity, suicide, &c., in which it not unfrequently ends, as the fact, that a gambler's work in no case increases the wealth or comfort of the state; all it can effect is a more or less rapid and dishonest transfer of these from one state of distribution to another. It is as useless, so far as regards production, as the prison-crank.

There is a common prejudice as to 'runs of luck,' which are popularly supposed *not* to be compatible with the mathematical theory. This, also, is a complete delusion. To take a very simple case, the reader will easily see that, if he writes down all the possible cases which may occur in six tosses of a coin, the odds are 19:13 in favour of a run of three at least.

To give an instance of the principle of interpretation which we have several times above applied to the mathematical result—viz., that the greater the number of trials, the more nearly will the average result of these trials coincide with it—let us recur to heads and tails. Suppose a coin tossed ten times, and let H^n stand for H n times, then we have

$$1 = \left(\frac{1}{2} + \frac{1}{2}\right)^{10} \\ = \frac{1}{2^{10}} \left(1 + 10 + \frac{10.9}{1.2} + \frac{10.9.8}{1.2.3} +, \&c.\right)$$

of which the terms are [as in (D)] the probabilities of H^{10} , H^9T , H^8T^2 , &c. respectively; the order not being taken account of. The largest term is the 6th, and its value is $\frac{252}{2^{10}} = \frac{252}{1024}$, or about $\frac{1}{4}$. This is the chance of H^5T^5 , without regard to order, in ten throws. Although the most probable result, inasmuch as the chances of H^5T^5 and H^4T^6 are each about $\frac{1}{5}$ only, and those of the other possible combinations much smaller—yet it has not a very large chance. But the chance of a result *not deviating much from the most probable one*, is very much larger: in the above case, the chance of having not less than 3H, and not less than 3T, is as much as $\frac{912}{1024}$. But this tendency of the bulk of the results to coincide very closely with the most probable one, is much more evident as we take a greater and greater number of trials. Thus, in 100 trials with the coin, we have—

$$1 = \left(\frac{1}{2} + \frac{1}{2}\right)^{100} \\ = \frac{1}{2^{100}} \left(1 + 100 + \dots + \frac{100.99.98\dots51}{1.2.3\dots50} +, \&c.\right)$$

[Now we begin to see how the higher analysis comes in. Who is to work out by common arithmetic the value of the fraction $\frac{100.99.98\dots51}{1.2.3\dots50}$?

Some calculating boy *might*, with no very enormous labour—but, wait a moment, we may wish to have the result of a million of trials, and what calculator (arithmetical) will tell us the value of

$$\frac{1,000,000 \times 999,999 \times \dots \times 500,001}{1 \times 2 \times \dots \times 500,000} ?$$

In this case, the most probable result is $H^{50}T^{50}$, without regard to order, but its chance is only about $\frac{2}{25}$.

[The exact value is $\frac{1}{2^{100}} \cdot \frac{100.99.98\dots51}{1.2.3\dots50}$]

Had there been 1000 throws, the chance of $H^{500}T^{500}$ (the most likely combination) would have been about $\frac{1}{38}$. But, as the number of throws increases,

the number of terms grouped close to the largest in the expansion, and whose sum far exceeds that of all the rest, becomes a smaller and smaller fraction of the entire number of terms. Hence the chance that in 1000 tosses there should not be more than 600 nor less than 400 H, is much greater than that of not more than 60 nor less than 40 H in 100 throws; and so on.

Thus it is that all our statistical results, say the ratios of the numbers of births, marriages, suicides, &c. to the whole population—or that of the male to the female births—or that of the dead letters to the whole number posted, &c.—though perhaps never the same in any two years, yet fluctuate between very narrow limits. And thus it is that the theory of Probabilities has been the means of solidly establishing, beyond almost the possibility of failure, when properly applied, the inestimable securities afforded by life-assurance.

Another very important application of the theory is to the deduction of the *most probable* value from a number of observations (astronomical, meteorological,

&c.), each of which is liable to error. We may confidently assert that, but for this, astronomy could not have taken the gigantic strides by which it has advanced during the present century. But the '*Method of Least Squares*,' as it is called, which is furnished for this purpose by the theory of probabilities, is far beyond the scope of elementary mathematics, and can therefore only be referred to here. Its fundamental features may be seen in the above process of determining the probability that the result of a number of trials shall lie within certain limits on each side of the most probable result.

The theory of Probabilities has been applied to many other important questions, of which we may mention only two—the value of evidence, and the probability of the correctness of the verdict given by various majorities in a jury. But for these, and for the further development of what we have given above from the simplest points of view, we must refer to the various treatises on the subject. Of these, the most accessible to an English reader are the very valuable works of Galloway and De Morgan. Poisson, Gauss, and especially Laplace, have also treated the subject in the most profound manner. But the difficulty of understanding Laplace's great work is such, that few have ever mastered it completely; and it is therefore particularly satisfactory that the late Professor Boole, in his *Laws of Thought*, has shewn how to dispense with a great part of the analysis which renders Laplace's work so formidable.

PROBATE COURT is a court created in England in 1858, in lieu of the old Prerogative Courts, to exercise the exclusive jurisdiction in all matters touching the succession to personal estate. The rules on which its jurisdiction is founded are, that whenever a man dies he must either leave a will or not. If he leave a will, then it must be produced and verified, so as to demonstrate to all parties interested that it is an authentic will, and has been duly executed and signed in presence of witnesses, and therefore that the right to the personal estate is vested in the executors named by the will. The will is sworn to by the witnesses, on being produced; and if the evidence is satisfactory, it is registered, and the original deposited in the court, when copies are made. This process is called proving the will, and the act of court is called the probate of the will. If there is no will, then the rule being, that the personal estate devolves on the next of kin and widow, if any, it is necessary that an application be made to the court to appoint one of the next of kin to be the administrator, and take charge of the payment of debts. This is called taking out administration, and the act of the court appointing the administrators is called letters of administration. Numerous difficulties often arise as to irregularities in the making of wills and as to the party entitled to administration, and it is the function of the Court of Probate to dispose of these.

PROBOSCIDEA, a section of *Pachydermata*, of which the characters are given under that head, contains one recent and one fossil genus, *Elephas* (see **ELEPHANT**) and *Mastodon* (q. v.); so that the P. seem not to have been numerous at any period of the world's history. Notwithstanding the great size of these creatures, comparative anatomists have pointed out various resemblances in their dentition, osteology, &c., to rodents.

PROBOSCIS MONKEY. See **NASALUS**.

PROBUS, MARCUS AURELIUS, Emperor of Rome, was born at Sirmium, in Pannonia. His father, Maximus, served first as a centurion, and afterwards as a tribune in the Roman army, and died in

Egypt, leaving to his only son a good name and a moderate income. P. early entered the army, and had the good fortune to attract the favourable notice of the Emperor Valerian, who elevated him before the legal period to the rank of tribune. His subsequent conduct justified his rapid promotion, for he greatly distinguished himself against the Sarmatians on the Danube, and subsequently in Africa, Egypt, Asia, Germany, and Gaul, winning golden opinions from Valerian's successors, Gallienus, Claudius II., Aurelian, and Tacitus. By the last-named emperor, he was appointed governor of the whole Asiatic possessions of Rome, and declared to be the chief mainstay of the Roman power; and such was the zealous attachment evinced for him by his soldiers, whose respect and love he had equally won by his firm discipline, by his care in providing for their wants and comforts, and his liberality in the distribution of plunder, that, on the death of Tacitus, they forced him to assume the purple; and his rival, Florianus, having been removed, P. was enthusiastically hailed emperor by all classes (276 A. D.). His brief reign was signalised by brilliant and important successes; the Germans, who, since Aurelian's time, had made Gaul almost a part of Germany, were driven out with enormous slaughter, pursued into the heart of their own country, compelled to restore their plunder, and to furnish a contingent to the Roman armies. Pursuing his victorious career, P. swept the inimical barbarians from the Rhetian, Pannonian, and Thracian frontiers, and forced Persia to agree to a humiliating peace. Various aspirants to the imperial purple were also put down. On his return to Rome, P. celebrated these fortunate achievements by a triumph, and then, the external security of the empire being established, devoted himself to the development of its internal resources. The senate was confirmed in its privileges; liberal encouragement was given to agriculture; numerous colonies of barbarians were established in thinly-peopled spots, that they might adopt a civilised mode of life; and all branches of industry were protected and promoted. But P. was at a loss what to do with his army, as the Romans had now no enemies either at home or abroad; and fearing that their discipline would be deteriorated by a life of inactivity, he employed the soldiers as labourers in executing various extensive and important works of public utility. Such occupations, considered as degrading by the soldiers, excited among them the utmost irritation and discontent; and a large body of troops, who were engaged in draining the swamps about Sirmium, giving way to these feelings, under the excitement produced by the presence of the emperor, murdered him, 282 A. D. P. possessed great military genius, combined with equal administrative talent, and added to these a wisdom, justice, and amiability equal to that of Trajan or the Antonines.

PROCESS is the system of action by which a court calls parties into court for purposes of litigation. There are numerous rules governing the steps of process, but these are all of a technical nature.

PROCESSION OF THE HOLY GHOST, that doctrine regarding the Third Person of the Blessed Trinity which teaches that as the Son proceeds (or is born) from the Father, so the Holy Ghost proceeds (or emanates) from the Father and from the Son, but as from one principle. The question of the origin of the Holy Ghost was not distinctly raised in the early controversies, which fell chiefly upon the Second Person. In the Creed of Nicea, no allusion whatever is made to the subject; and in the Creed of Constantinople, the Holy Ghost is said simply to 'proceed from the Father.' Nevertheless, this was

understood in the Latin Church to mean that, as the Son proceeds from the Father, the Holy Ghost proceeds from both Father and Son; and in the course of the 7th and 8th centuries, the words 'and from the Son,' for greater distinctness, came to be added to the creed in several churches—as the West. In the controversy with the Latins, Photius (q. v.) took exception to this addition, as unauthorised, and made the addition one of the grounds for his charge of heresy against them, which was resumed on the consummation of the schism under Michael Cerularius. In the union of the Greek and Latin churches at Florence (1437), an article of agreement on this head was adopted, and the words *Filioque* were sung twice over both in Latin and in Greek, in the solemn mass which celebrated the union. But this union had no root in the popular mind, and the dispute still continues as of old to divide the churches.

PROCESSIONAL (Lat. *processionale*), the service-book which contains the prayers, hymns, and general ceremonial of the different processions. Many ancient books of this class have been preserved. The processional approved for common use is that of Rome, of which many editions have been published.

PROCESSIONS, as solemn and religious rites, are of very great antiquity. With the Greeks and Romans, they took place chiefly on the festivals of Diana, Bacchus, Ceres, and other deities; also before the beginning of the games in the Circus; and in spring, when the fields were sprinkled with holy water to increase their fertility. The priests used to head them, carrying images of the gods and goddesses to be propitiated, and either started from certain temples or from the Capitol. Among the Jews, certain processions around the altar were (and still are to a certain extent) usual on the Feast of Tabernacles; and from them the Mohammedans have adopted their mode of encompassing the sanctuary seven times at Mecca (q. v.). Processions form a prominent part of the Buddhist worship. The practice was early adopted in the Christian Church. The Reformation abolished it; and even in the Roman Catholic Church, especially in mixed countries, processions are less frequent or popular now than in former years. They are there either supplicatory processions or cross processions, and are either directed to a certain distant place, to some miraculous image or object, or they are confined to the streets of the cities and the churches. Banners, crosses, and images are generally carried in front; the clergy follow; and the people make up the rear, singing hymns or reciting prayers. In some Protestant states, they are still permitted, under certain restrictions. There is no doubt that, whatever their general intrinsic value, they offer in many instances one of the most strikingly picturesque features of the Roman faith; and that they answer a certain instinctive want in the multitude. For extensive pilgrimages, as such, their history and rites, we refer to PILGRIM, MECCA, FESTIVALS, &c.

PROCHEIN AMI, the old Norman-French for next friend, still often used in English law, means the person in whose name an infant sues in a court of law, or a married woman in a court of equity. The chief object is to have a person responsible for costs. See NEXT FRIEND.

PRO'CIDA, an islet of Italy, between the island of Ischia and the shores of Naples, and separated from both of these by sea-ways about a mile in width, is three miles long and one mile broad. Pop. 13,810. On its shores is the city of the same name, with a commodious harbour, a fine regal palace, and

a horrible state-prison, recently rendered famous by Carlo Poerio, who was confined there in chains.

PROCLAMATION, a public notice given by the sovereign to his subjects. The power of issuing proclamations is part of the prerogative of royalty as the fountain of justice. They sometimes consist of an authoritative announcement of some matter of state, or act of the executive government affecting the duties and obligations of subjects. The demise of the crown, and accession of a new sovereign, a declaration of war, and the issue of new coin, are all occasions on which a royal proclamation is issued. A proclamation may also be issued to declare the intention of the crown to exercise some prerogative or enforce some law which has for a long time been dormant or suspended. In time of war, the crown by a proclamation may lay an embargo on shipping, and order the ports to be shut. But the most usual class of proclamations are admonitory notices for the prevention of offences, consisting of formal declarations of existing laws and penalties, and of the intention to enforce them; such as the proclamation against vice and immorality, appointed to be read at the opening of all courts of Quarter Sessions in England.

Proclamations are only binding when they do not contradict existing laws, or tend to establish new ones, but only enforce the execution of those which are already in being, in such manner as the sovereign judges necessary. A proclamation must be under the Great Seal. Statute 31 Henry VIII. c. 8 declared that the king's proclamations should be as binding as acts of parliament; an enactment which, while it subsisted, made an entire revolution in the government; but was repealed by 1 Edw. VI. c. 12. In later times, it was attempted to be maintained by the crown lawyers that the king might suspend or dispense with an existing law by proclamation; a power, however, which act 1 Will. and Mary c. 2 declared not to exist.

PRO'CLUS, called the Successor (*Diadochos*)—i. e., of Syrianus, as the head of the Athenian school—a celebrated Neo-Platonist, was born in Constantinople in 412. He was of Lycian origin, and received his first instruction at Xanthus, in Lycia. He then studied at Alexandria under Arion, Leonaras, Hero, and especially under Heliodorus, with whom he applied himself chiefly to Aristotelian and Platonic philosophy. From thence he went to Athens, where a certain Plutarch, a philosopher, and his daughter, Asclepiogeneia, became his instructors—the latter a priestess of Eleusis, chiefly in theurgic mysteries. The vivid imagination and enthusiastic temperament which in his childhood already had led him to believe in apparitions of Minerva and Apollo, naturally convinced him, when all the influences of the Mysteries (q. v.) were brought to bear upon him, still more of his immediate and direct intercommunication with the gods; and he distinctly believed himself to be one of the few chosen links of the Hermaic chain through which divine revelation reaches mankind. His soul had, he thought, once lived in Nicomachus the Pythagorean, and, like him, he had the power to command the elements to a certain extent, to produce rain, to temper the sun's heat, &c. The Orphic Poems (q. v.), the writings of Hermes, and all that strangely mystical literature with which the age abounded, were to him the only source of true philosophy, and he considered them all more or less in the light of divine revelations. That same cosmopolitan spirit in religious matters which pervaded Rome towards her end, had spread throughout all the civilised 'pagan' world of those

Hungary, as far as Presburg. In 1429, P. made inroads into the German states as far as Magdeburg, and returned to Bohemia laden with spoil, and followed by a numerous band of captive nobles and knights; and in the following year, at the head of 50,000 men-at-arms, and half as many horsemen, he again broke into Misnia, Franconia, and Bavaria, and after having burned 100 castles and towns, and destroyed 1400 villages and hamlets, and carried off a vast amount of treasure, turned his arms against Moravia and Silesia. The Emperor Sigismund at this crisis offered to treat with him, but the imperial demand, that the Hussites should submit to the decision of a council, afforded P. a pretext for breaking off all negotiations with the imperial court. A second German crusading army now advanced in 1431, but was thoroughly defeated at Riesenburg. These successes, which were followed by others of nearly equal importance in Silesia, Hungary, and Saxony, where the princes had to purchase peace at the hands of the two Procopi, on humiliating terms, induced the council of Basel to propose a meeting between the Hussite leaders and ten learned Catholic doctors. The meeting lasted fifty days, but was productive of no good result, and P. returned to Bohemia, where, combining his forces with those of Procop the Lesser, he laid siege to Pilsen. The council, on this, passed an act, known as the Basel Compact, by which the Hussites were allowed the use of the cup in the Lord's Supper, and the Bohemians were designated by the title of the 'First Sons of the Catholic Church.' The Taborites and Orphans, under the leadership of the two Procopi, refused, however, to have anything to do with the pope, and hence dissensions arose between them and the more moderate of the Hussites. After many lesser encounters between these factions, a decisive battle was fought near Lipau in 1434, in which P. was induced, by a feint of the enemy, to leave his intrenchments. His followers at first fought desperately against the troops of the Bohemian nobles, who were commanded by Meinhard of Neuhaus; but at length, under the influence of a sudden panic, they gave way, and took to flight. P., after vainly striving to re-form their broken lines, threw himself into the midst of the enemy, and was killed. Procop the Lesser, following in his steps, was also slain, and with these two brave Hussite leaders the cause of the Taborites perished.

PROCOPIUS, an eminent Byzantine historian, was born at Cæsarea, in Palestine, about the beginning of the 6th c., went to Constantinople when still a young man, and acquired there so high a reputation as a professor of rhetoric, that Belisarius, in 527, appointed him his private secretary. P. accompanied the great warrior in all his important campaigns in Asia, Africa, and Italy, and appears to have displayed remarkable practical as well as literary talent, for we find him placed at the head both of the commissariat department and of the Byzantine navy. He returned to Constantinople shortly before 542, was highly honoured by Justinian, and appointed prefect of the metropolis in 562. His death occurred, it is thought, about three years later. P.'s principal works are his *Historice*, in 8 books (two on the Persian war, from 408 to 553; two on the war with the Vandals, from 395 to 545; four on the Gothic war, going down to 553); *Ktemata*, or six books on the buildings executed or restored by Justinian; and *Anekdotai*, or *Historia Arcana* (of doubtful genuineness), a sort of *Chronique scandaleuse* of the court of Justinian, in which the emperor, his wife Theodora, Belisarius, his wife Antonina, and other distinguished persons, are depicted in the darkest colours. The most valuable

of these productions is undoubtedly the first, in which P. writes with the clearness, weight, and fulness of knowledge that might be expected of a man who had been an eye-witness of much of what he narrates, and who had occupied a position that fitted him to thoroughly understand what he had seen. He is the principal authority for the reign of Justinian. His style is pure, vigorous, and flexible. The best edition of his complete works is that by Dindorf (3 vols., Bonn, 1833—1838).

PROCRUSTES (Gr. 'the Stretcher'), the surname of a celebrated robber of Attica, named Damastes, or Polypemon. According to the ancient legend, he was wont to place all persons who fell into his hands upon a bed which was made either too long or too short for them, and where he racked their limbs till they died. This he continued to do until Theseus overpowered him, and made him suffer the tortures he had inflicted on others. The story has given rise to a figurative expression. When an author is subjected by a critic to a cruel or unfair mode of criticism, he is said to be stretched on 'the bed of Procrustes.'

PROCTER, BRYAN WALTER, an English poet, better known as BARRY CORNWALL, was born in 1787, and educated at Harrow. He studied law, was called to the bar in 1831, and for many years was one of the Commissioners of Lunacy, but resigned in 1860, and was succeeded by his friend Mr Forster, the historical essayist. His *Dramatic Scenes and other Poems* were published in 1819, and since that period he has produced several volumes both of verse and prose, the most important being *Mirandola*, a *Tragedy*. As a poet, P. belongs to the school of Keats and Hunt, and through all his works the influence of the old English dramatists may be traced like a vein through an agate. *Mirandola* was produced at Covent Garden Theatre, where it had considerable success. It is not, however, on his *Dramatic Scenes* or his tragedies, but on his songs, that P.'s reputation rests. He may fairly be considered the best of our modern English song-writers. The best collection of his songs is that published in 1851.

PROCTOR (formed by contraction from Lat. *procurator*, one who cares for another) is the name given to the practitioners in Courts of Admiralty, and in the Ecclesiastical and Prerogative Courts. It corresponds to attorney or solicitor in the other courts. By a recent statute, which abolished the exclusive jurisdiction of the Admiralty and Prerogative Courts, now the Probate Court, all proctors were put on the same footing as attorneys and solicitors, and the power to practise in the new courts indifferently was given to each; and at the same time compensation was given for the loss of their monopoly. The mode by which one becomes a proctor is therefore the same as that by which one becomes an Attorney or Solicitor (q. v.).

PROCTORS, officers in the universities of Oxford and Cambridge (two in number in each), whose duties are to preserve the peace of the university, to repress disorders among the students, and inflict summary academical punishment. They have the command of the academical constabulary force, and have also an extensive police jurisdiction in the town. The proctors must be Masters of Arts, and are chosen by the colleges according to a certain rotation. They nominate two pro-proctors to be their deputies and assistants. The summary authority of the proctors extends both to undergraduates and Bachelors of Arts. They have also a legislative authority as assistants to the heads of houses, and vote in the election of some of the professors and other officers.

the latter being, however, admissible when employed to strengthen a part.

PROHIBITION. Prohibitive duty refers to a practice, obsolete in this country, of prohibiting the importation of goods, with the view of encouraging native industry. See **FREE TRADE**.

PROHIBITION is a writ in England proceeding out of a superior court of law to prohibit or prevent an inferior court from proceeding to hear or dispose of a suit or matter over which it has no jurisdiction. —In Scotch law, the same word means a technical clause in a deed of entail by which the heir of entail is prohibited from selling the estate, or contracting debt, or altering the order of succession under pain of forfeiture, which forfeiture is declared by another supplemental clause called a *resolutive clause*.

PROJECTILES, THEORY OF, is the investigation of the path or *trajectory*, as it is called, of a body which is projected into space in a direction inclined to that of gravitation. A body thus projected is acted upon by two forces, the *force of projection*, which, if acting alone, would carry the body onwards for ever in the same direction and at the same rate; and the *force of gravity*, which tends to draw the body downwards towards the earth. The force of projection acts only at the commencement of the body's motion; the force of gravity, on the contrary, continues to act effectively during the whole time of the body's motion, drawing it further and further from its original direction, and causing it to describe a curved path, which, if the body moved in a vacuum, would be accurately a parabola. This is readily seen by considering fig. 1, in which A represents the point from which the body is projected (suppose the embrasure of a fort); AB the direction of projection (horizontal in this instance); AI the distance which would be passed over by the projectile in unit of time if gravity did not act; 1—2, the distance which would

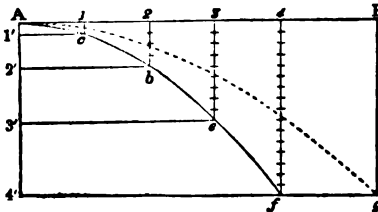


Fig. 1.

similarly be described in second unit of time; 2—3, 3—4, &c. the distances corresponding to the third, fourth, &c. units of time—all these distances being necessarily equal, from the impulsive nature of the force of projection; AI', again, represents the distance which the projectile would fall under the action of gravity alone in the first unit of time; 1'—2' the distance due to gravity in the second unit of time; 2'—3' the distance due to the third unit, &c., the distances AI', AZ', A3', &c., being in the proportion of 1, 4, 9, &c. (see **FALLING BODIES**); hence, by the well-known principle of the *Composition of Forces and Velocities* (q. v.), we find at once, by completing the series of parallelograms, that at the end of the first unit of time the body is at c, at the end of the second at b, at the end of the third at e, &c. Now, as the lines 1'c, 2'b, 3'e, &c. increase as the numbers 1, 2, 3, &c., and the lines AI', AZ', A3', &c. as the numbers 1², 2², 3², it follows that the curve Acbe is a Parabola (q. v.). As, by the second law of motion, each force produces its full effect undisturbed by the other, it follows that the projectile reaches f in

the same time as it would, without being projected, have taken to fall to 4'. A greater velocity of projection would make it take a wider flight; but at the end of four seconds, it must still be at some point in the same horizontal line—at g, for example.

In order to determine exactly the motion of a projectile, and to find its range, greatest altitude and time of flight, it will be necessary to examine its nature more technically—for which some slight knowledge of algebra and trigonometry is requisite. Let the body in this instance be projected obliquely to the direction of gravity, from the point A (fig. 2) in the direction AT, and let the velocity of projection v be sufficient, if gravity were not to act, to carry it to T in t units of time, and let the force of gravity, if allowed to act upon it at rest, carry

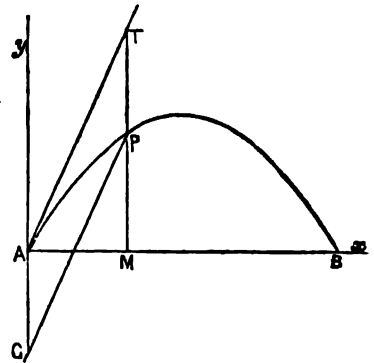


Fig. 2.

it to G in the same time; then, as before, the body, under the action of both forces, will be found at P (which is found by completing a parallelogram, in which AT and AG are the sides) at the end of t units of time, having fallen through a distance equal to TP (not at once, but in a constant succession of minute deflections, as indicated in fig. 1) in that time. Let t represent the time of flight, v the velocity due to projection, g the accelerating force of gravity, and let A be the angle of elevation TAB; then $AT = vt$, $TP = \frac{1}{2}gt^2$, $TM = vt \sin A$; and consequently PM (or y) = $vt \sin A - \frac{1}{2}gt^2$ (I), and AM (or x) = $vt \cos A$. Now, if we find from the last two equations the values of t , and equate these values, we obtain, by an easy algebraic process, the equation $y = x \tan A - \frac{gx^2}{2v^2 \cos^2 A}$;

and if the height through which the body must fall to acquire a velocity equal to the velocity of projection be called h , then $v^2 = 2gh$, $h = \frac{v^2}{2g}$.

$4h = \frac{2v^2}{g}$, and $\frac{1}{4h} = \frac{g}{2v^2}$, substituting which in the

equation, we obtain $y = x \tan A - \frac{x^2}{4h \cos^2 A}$ (II),

as the equation to the path of a projectile, where x is the horizontal distance, and y the corresponding height above the level of the point of projection. Suppose, now, that we wish to find the time of flight on the horizontal plane, it is evident that at the end of its flight the projectile will be at B, and y will be equal to zero; hence, putting $y = 0$ in equation I, we obtain $t = \frac{2v \sin A}{g}$. The range or

distance AB is similarly found by putting $y = 0$ in equation II, when x is found to be equal to $4h \sin A \cos A$, or $2h \sin 2A$. The greatest altitude

cases of costiveness, piles, &c. Whenever it occurs, the parts should be washed, and, if possible, replaced by careful pressure with the hand; and if they do not easily return, the forefinger should be oiled, and pushed up into the anus, and it will convey the protruded intestine with it, after which the patient should retain the recumbent position for some hours. If it cannot be returned by the above means, surgical assistance should be at once sought. In order to remove the tendency to prolapsus, the patient should regulate his bowels so as to avoid costiveness, should sponge the parts after every evacuation with cold water or soap and water, and if necessary, use astringent injections, as, for example, a weak solution of sulphate of iron, one grain to the ounce. Dr Druitt (in his *Surgeon's Vade Mecum*) recommends a plan first suggested by Dr M'Cormac—namely, that when the stools are passed, the skin near the anus should be drawn to one side with the hand, so as to tighten the orifice. If, after the adoption of these means, the bowel continues to descend, certain surgical means must be resorted to, as destroying a small portion of the relaxed mucous membrane by the application of nitric acid, or pinching up a few folds of the protruded membrane with the forceps, and applying ligatures to them.

PROLAPSUS UTERI—known also as **PROCTO-DENTIA** or **DESCENSUS UTERI**, by writers on the diseases of women; and as 'falling down of the womb,' or 'bearing down,' among non-professional persons—consists essentially in a depression of the womb below the natural level in the pelvis. It is a common affection amongst all ranks, and is most frequent in women beyond the middle age who have borne large families. It has, however, been met with in women who have not borne children, in virgins, and even (although very rarely) in children. It may occur in every degree, from the case in which the mouth of the womb is a little lower than its natural level, to that in which the womb itself projects externally, and forms a protruding tumour as large as a melon. In the latter case, it displaces by its traction the bladder, rectum, and other important structures. The prolapse is termed *imperfect* as long as there is no external protrusion, and *perfect* when the womb is protruded externally. The causes of these different degrees of prolapse are the same, and the symptoms differ only in intensity. The immediate causes are, according to Sir C. Clarke: (1.) Relaxation of the ligaments of the uterus; (2.), a want of due tone in the canal leading from the uterus to the external surface. The latter is probably the chief cause. After many child-bearings, it remains dilated, and its walls lose their resisting power. Similar effects result from repeated uterine hæmorrhage, leucorrhœa (popularly known as the *Whites*), and general debility. Under these conditions, a very slight downward force will depress the womb; and this force is supplied by the increased weight of the organ itself, if the patient sit up or walk soon after delivery, by violent vomiting or straining (when the bowels are constipated), by the endeavour to lift heavy weights, &c.

The symptoms arise partly from the pressure of the womb on other organs, partly from the simultaneous displacement of adjacent parts (as the bladder, rectum, &c.), and partly from reflex action (see **NERVOUS SYSTEM**). Patients with only a slight displacement usually complain of a sensation of fullness in the pelvis, of weight and bearing down, of dragging from the loins, often amounting to pain in the back, these symptoms being aggravated when the upright position is assumed. Strangury (q. v.) is occasionally present, and if the womb descend low or protrude, there is always more or less difficulty in evacuating the contents of the bladder and

rectum. The digestive organs soon become affected through reflected nervous influence. It is a remarkable fact, that the general health is often much worse in those cases in which there is a slight depression, than in those in which the prolapse is complete, and the womb forms an external tumour.

The treatment varies with the degree of displacement. In the milder cases, medicine should be administered with the view of giving tone to the mucous membrane of the relaxed canal; while in the severe cases, mechanical support is requisite. In comparatively mild cases, prolonged rest in the horizontal position should be enforced, and cold water (from half a pint to a pint) should be slowly injected, night and morning, into the canal leading to the uterus, by means of an elastic bottle, the patient being in the recumbent position as she receives the injection. If this treatment is insufficient, astringent injections, as decoction of oak-bark or of galls, or a solution of alum (an ounce to the pint of water), should be tried. If, however, there is any congestion or inflammation of the parts, astringents must be avoided. In a case of complete prolapse, the first duty of the practitioner is to attempt to restore the womb to its natural position. It is sometimes necessary to place the patient in a warm bath, or to apply fomentations or leeches to the tumour before it can be replaced; and occasionally, irreducible cases occur, in which it may be necessary to remove the organ altogether. But suppose it returned to its position, a repetition of the prolapse has to be prevented. The ordinary method is by the introduction of a pessary—an instrument of an oval or globular form, and usually made of box-wood, which mechanically supports the uterus in its normal position. See the works of Churchill, West, and others *On the Diseases of Women*. In some cases, a compress and bandage will afford sufficient support; while in other cases a surgical operation similar to that which is performed for *Prolapsus Ani* (q. v.) is expedient.

PROLÉTAIRES, a term used by the French (from whom it has been partially adopted by recent English and German writers) to denote the lowest and poorest classes of the community. It is derived from the Latin *proletarii*, the name given in the census of Servius Tullius to the lowest of the centuries, who were so called to indicate that they were valuable to the state only as rearers of offspring (*proles*).

PROMETHEUS (Forethought), the son of the Titan Iapetus and of Clymene, brother of Atlas, Menœstius, and Epimetheus (Afterthought)—or, according to other legends, the son of Iapetus and Asia, or of Uranus and Clymene, or of Eurymedon and Here—the father of Deucalion, Hellen, Lykus, and Chymærus. The myth of P. is one of the oldest of Greek antiquity, being mentioned by Hesiod, and is briefly as follows:—Once, under the reign of Zeus, men and gods were disputing with one another at Mecone; P., with a view to outwit Zeus, cut up a bull, and divided it into two parts, hiding the meat and the intestines in the skin, and putting a bad piece (the stomach) at the top of it; while he laid in another heap the bones, which were covered with fat. Zeus pointed out the unequal division, but was asked to choose, whereupon he guessed the deceit practised, and selected the good portion; but irate at the stratagem, he avenged himself on the mortals by withholding from them the fire necessary for the cooking of the meat; whereupon P. stole it in a hollow staff, and brought it to them. Zeus, to punish the mortals, caused Hephestus to mould a virgin of rapturous beauty, Pandora, whom Epimetheus was unwisely

In *Austria*, all officers are at first cadets; but a large proportion of these cadets are nominated from men in the ranks by their comrades. The men themselves are conscripts, enrolled for eight years. Promotion goes by seniority, and in the regiment, with occasional selection from other regiments.

The organisation and officering of the *Prussian* army are both peculiar. Every Prussian subject, of whatever rank, is bound to serve from the age of 20 to 25; but in practice, this service is reduced to a year in the case of professional men. Every officer must serve in the ranks; but not necessarily for more than a day. Young gentlemen intended for officers enter the ranks as *aspirants*. They do duty as common soldiers for from six to nine months, and pass two examinations. Afterwards they remain nine months at a Division School, or twelve months at an Artillery and Engineer School. They then become eligible for appointment as officers when vacancies occur, which, however, they cannot obtain unless recommended by the officers of their respective regiments. Two-thirds of the first commissions are given to these aspirants, and one-third to pupils from the cadet schools.

In the *Italian* army, one-third of the sub-lieutenants are promoted from the ranks. Of subsequent promotion, two-thirds go by seniority, and one-third by selection.

It is always urged against the *British* system of army promotion that it is too exclusive, and confines the commissions to the upper classes of society; and there is no doubt that promotion from the ranks is much rarer than in almost any other army. But, on the other hand, it is argued, the constituents of the force are very different. Soldiers in Britain are not conscripts, who necessarily comprise men of all classes and all degrees of education, but are taken, as a rule, from an extremely low and very uneducated class of society. Again, Britain has a true middle class, which is wanting in almost every continental nation. Its army is not, therefore, necessarily aristocratic because it is not officered from the ranks. Lastly, the habits of the different classes of society differ so greatly, that unless the soldier be very superior to his comrades, promotion to a commission is a small boon.

With regard to the actual system of promotion which obtains: in the ranks, promotion from private up to company-sergeant takes place in the company, and is made by the regimental officers. The promotion of company-sergeants to be staff-sergeants is made throughout the regiment. All these promotions are by selection entirely. Of the commissioned officers, the quarter-masters and riding-masters are appointed almost exclusively from the ranks; but they have no further promotion to look forward to—sergeants and sergeants-major are occasionally gazetted to ensigncies or lieutenantcies without purchase, but not very frequently. The junior combatant officers acquire their commissions either by a competitive examination, without purchase, or by a pass-examination with purchase. The Artillery and Engineers are non-purchase corps, and are officered entirely by cadets from the Royal Military Academy, whose subsequent promotion is by seniority only. The Cavalry, Military Train, Guards, and Line are purchase corps. The vacancies, if caused by officers selling out, are filled by officers buying in; if caused by death or augmentation, they are filled from Sandhurst Military College by cadets, who are selected through competitive examination, and who do not purchase, or by gentlemen buying subaltern commissions: a small proportion of these vacancies are also filled from the ranks. The promotion of officers, up to the

rank of captain, is exclusively regimental, and by seniority, qualified, in purchase corps, by purchase. See PURCHASE SYSTEM. Above the rank of captain, the same principle holds for *substantive* or *regimental* rank; but officers may hold at the same time *army* or *brevet* rank, conferred for distinguished service, or for mere seniority in the general list of the whole army. This brevet rank cannot be purchased, does not affect the position in a regiment, and adds but a small sum to the officers' pay; but it is of great importance, inasmuch as colon is raised by seniority alone to be general officers, and colonel is almost exclusively a brevet rank (the only exceptions being in the Artillery and Engineers, where colonel is a regimental rank). Under these rules, it sometimes happens that an officer who has never held higher regimental rank than captain, may become successively, for good service, brevet-major, brevet-lieutenant-colonel, and brevet-colonel, until he succeeds, in his turn, to the rank of major-general. See also STAFF.

In the Navy, the promotion of sailors to be petty officers is made by the captain of the ship; petty officers are appointed to be warrant-officers by the admiral of the station, subject to Admiralty confirmation. The commissioned officers are appointed and promoted by patronage solely. When a ship is first commissioned, the captain is allowed to nominate one cadet, the Admiralty name the rest. Promotions are made by selection by the Admiralty, except death vacancies which occur abroad; these are filled up by the admiral commanding on the station from the officers of his fleet. Above the rank of captain, all promotions take place by absolute seniority. There is no purchase of commissions in the navy.

PRONA'OS, the area or space before the cell of a temple, through which it was entered.

PRONG-HORN, or PRONG-HORNED ANTELOPE (*Antelope furcifer*, *Dicotyles furcifer*, or *Antilocapra americana*), a species of antelope inhabiting the great western prairies of North America. It is the *Cabrit* or *Cabres* of the Canadian voyageurs,

Prong-horned Antelope (*Antelope furcifer*).

is also called *Goat* by the fur-traders, and sometimes receives the name of *Spring-buck*. It is common between the Saskatchewan and the Missouri, and also on the Columbia, and is found in plains and on low hills, where there is no wood, or only scattered clumps of trees; never in mountainous districts, nor in forests. Its size is nearly that of

am, tunc; Ger. *dann*; Eng. *so, as, then, thus*. Another demonstrative radical, *ma*, seems to have been used to call attention to the speaker—to point to the immediate or central 'here'; in short, to the 'me.' Besides occurring in the oblique cases of the first personal pronoun, the element *ma* or *m* enters largely into the suffixes of the first person of verbs in the older languages, such as Greek and Latin. The only remnant of it in English is in *I am*. The nominative case of the first person pronoun in Sansc. is *ahm*, which is conjectured to be a mutilation of a fuller form, *ma-gha-m*; in Gr. and Lat. *ego*, Goth. *ik*, Ger. *ich*, A.-S. Eng. *I*, Ital. *io*, Fr. *je*, the *m* has completely disappeared. In the oblique cases it has been better preserved. The root of the 2d pers. pron. seems to have been the syllable *tu* or *tva*, indicating a position intermediate between the central 'here' and the more distant and contrasted 'there.' The form of this pronoun is more constant throughout the allied languages than that of any other: Sansc. *tvām*, Lat. *tu*, Gr. *ty* or *sy*, Ger. *du*, Eng. *thou*, Fr. *tu*, Ital. *tu*.

The pronouns of the first and second person are invariable in respect of gender, and are never used as adjectives; the pronouns of the third person not only take the form of adjectives in respect of gender, but are often—especially in the older languages—joined to nouns, in which case they are rather demonstrative (or relative) adjectives than pronouns; as Lat. *ille homo*, Eng. *that book*. It is difficult to trace any etymological relations between the singular and the plural in the first and second pronouns—e. g., between Lat. *tu* and *vos*, or Eng. *thou* and *you*; but this is not to be wondered at when we reflect that 'we' is not equal to 'I' and 'I,' but to 'I' and 'he,' or 'I' and 'thou;' and that 'you' is as much 'thou' and 'he' as 'thou' and 'thou.' The plurals must therefore have been compounded of several elements, which, by coalescence and abrasion, have become irrecongnisable.

The declension of the English personal pronouns is to be found in any elementary grammar. That of the third person is made up of fragments of several Anglo-Saxon words. The Anglo-Saxon pronoun was thus declined:

Sing.	Nom.	<i>he</i> (he), <i>heō</i> (she), <i>hit</i> (it)
	Gen.	<i>his</i> <i>hirs</i> <i>his</i>
	Acc.	<i>hine</i> <i>hi</i> <i>hit</i>
	Dat.	<i>him</i> <i>hirs</i> <i>him</i>
Plur.	Nom.	<i>hi</i>
	Gen.	<i>hira</i> (heora)
	Dat.	<i>him</i> (heom)

The cases marked in italics are still used in modern English, only that *him* and *her* do duty in the accusative as well as dative. *His*, as the genitive of the neuter, has been supplanted in recent times by the secondary genitive *its*, a word which does not occur once in the English version of the Bible. *She* does not represent the Anglo-Saxon *heō*, but *seō*, the feminine of the article. The modern plurals *they*, *their*, *them*, have no direct etymological connection with the singular *he* (she, it); they are taken from the demonstrative or article *thæt* (that, the), which has, in the plural, nominative and accusative *thā*, genitive *thāra*, dative *tham*. *Them*, like *him*, was thus originally a dative case. Is it a lingering memory of the demonstrative origin of *them* that keeps alive the vulgar error of 'them things'?

Such being the arbitrary, or rather chance way in which the English pronominal system has been built up out of the wrecks of the Anglo-Saxon, there is no good reason why *them*, *him*, *her*, should not have been used in the nominative as well as in

the accusative; and, in fact, in certain connections, these forms, together with *me*, are habitually so used, although grammarians have hitherto refused to sanction the usage. Such expressions as, 'It is me;' 'better than him, than them,' &c., are not confined to the uneducated; in familiar conversation, the most cultivated use them habitually, and in preference to what are considered to be the correct forms, which are felt somehow to be stiff and pedantic. This usage has the analogy of the French in its favour (e. g., *c'est moi*), and some English philologists have begun to defend it on principle. See Alford, *The Queen's English*.

From politeness and other rhetorical motives, various substitutes take the place of the usual personal pronouns. The English language departs little from the normal usage, except in *you* for *thou*, and in the regal and editorial *we*. A French shopkeeper, instead of 'What do you wish to see?' says: 'What does the gentleman (or lady) wish to see?' All modern languages use such substitutions as, 'Your Majesty, your Excellency, wishes;' but the Italian, in speaking further of the Excellenza, says: 'It (*ella*, she) wishes.' The Germans use regularly *they* (*sie*) for *you*, and one never hears *you* except from the pulpit. In Hebrew, politeness took the form of saying: 'Thy servant said,' for 'I said.' Similarly, the Chinese use: 'little man, subject, thief, blockhead,' for 'I;' and an American back-woodman speaks of himself as 'this 'oss,' or 'this here child.'

PROOF. See EVIDENCE.

PROOF OF FIRE-ARMS. Guns of all descriptions are proved before being issued for service. Muskets are tested by being fired with heavier bullets and larger charges of powder than they will in the ordinary way be required to carry. Cannon are subjected to a series of tests. First, they are gauged to ascertain that the dimensions are correct, the utmost variation permitted being .3 inch externally, and .033 in the diameter of the bore; but the position of the bore may deviate .25 inch from the line of the piece's axis. The next trial is by firing twice with heavy charges—the bore being subsequently minutely examined, to detect flaws or crevices in the metal. A cavity exceeding in depth .2 inch, if behind the first reinforce ring, or .25 if before that ring, condemns the piece. After the proof by firing, water is forced at a great pressure into the bore, in order that it may permeate any honey-combs or flaws; the next day, the bore is examined by means of a mirror, which casts a strong light into it. Flaws are then easily detected; for while the rest of the bore is thoroughly dry, water will continue for some time to weep or run from the holes, and will stand over them in drops. This operation completes the proof. When a gun bursts in proof, the remainder of the guns of the same sort then in proof are subjected to another round.

In the case of guns of hitherto untried form, some are tested to bursting, as specimens of the power and endurance of the whole number. For Proof of Powder, see *EPROUVETTE*.

PROPAGANDA (Lat. *De Propaganda Fide*, Regarding the Propagation of the Faith), the name of a Congregation, and also of a College, in Rome, the object of which is to direct and forward the propagation of the Catholic religion, especially among the heathen; although Christian dissenters from the Roman Church are not absolutely excluded from its operations. Pope Gregory XIII. (1572—1584) gave to some of the cardinals a special charge over the oriental missions, and caused catechisms and other religious books to be printed for the use of oriental Christians. The work which Gregory

of the prophetic office. This is apparent from the use of the word even in our English Bibles and our older theological literature. The sons of Asaph, for example, it is said (1 Chron. xxv. 3) 'prophesied with a harp, to give thanks and to praise the Lord,' in the sense of merely singing or uttering God's praise under the dictate of the divine Spirit. It is said also of Philip the Evangelist (Acts xxi. 9) that he had 'four daughters, virgins, which did prophecy,' in the sense merely or mainly of declaring the gospel. In like manner, Bacon speaks in his day of 'an exercise commonly called *propheying*,' which consisted in the exposition of a portion of Scripture by successive ministers at a meeting appointed for the purpose; and the well-known title of one of Jeremy Taylor's books, *The Liberty of Propheying*—i. e., the liberty of preaching—recalls the same use of the word.

Prophecy among the Jews was a distinct office or function constituted under the divine sanction. The prophets were an order instituted, or at least reformed and more thoroughly organised by Samuel. There were prophets, indeed, before; Abraham is called a prophet (Gen. xx. 7), and Moses also (Deut. xviii. 15; xxxiv. 10); Aaron is the 'prophet of Moses' (Ex. vii. 1), and Miriam is 'a prophetess' (Ex. xv. 20); but it was Samuel who first established the office as a systematic part of the Jewish religion. For this purpose, he gathered together companies of young men of promising spiritual attainments, who were trained under his superintendence for various religious duties—the exposition of the theocratic law, and the conduct of the theocratic worship, especially of its elaborate musical departments (1 Sam. x. 5; 1 Chron. xxv. 6). The use of the psaltery and tabret, pipe, harp, and cymbal, was the peculiar business of the prophets. The young men were set apart to make proficiency in these instruments; they were placed under an elderly head or president, who received the name of father, and they were called his sons. They were 'all under the hands of their father for song in the house of the Lord, with cymbals, psalteries, and harps, for the service of the house of God' (1 Chron. xxv. 6). The prophetic institutions have been called by modern divines 'Schools of the Prophets;' but this name does not occur in Scripture, nor even in our authorised version. 'Sons of the Prophets' is the only collective name applied to the separate companies into which they were formed by Samuel. These companies were located in special spots: in Ramah, the birthplace and residence of Samuel; in Bethel, Gilgal, Jericho, and ultimately Jerusalem. They lived in huts made of the branches of trees; wore a simple, characteristic dress; had their meals together, and were found in numbers sometimes of 50, sometimes even of 400. For a prophet not to have been trained in one of these institutions, was deemed, as Dean Stanley says (*Jerish Church*, vol. i. p. 429), 'an exceptional case.' Some, like Isaiah in Jerusalem, or Elisha in Samaria, lived in great towns, in houses of their own. The higher prophets had inferior prophets or servants attendant upon them, whose duty it was to pour water upon their hands, and secure provisions for them (2 Kings, iii. 11; v. 22). Thus, Moses had Joshua and others; Elijah had Elisha; Elisha had Gehazi. Many of them were married, and had families; for example, Moses, Samuel, Deborah, David, Hosea, Isaiah, Ezekiel. The wife was sometimes, as in the case of Isaiah, called 'the prophetess.'

The prophets, according to this description, were a peculiar order of teachers among the Jews; prophecy, a distinctive part of the divine economy, by which God trained and educated the 'chosen

people.' Beginning in a definite, though still unorganised form, with Moses (for it is only incidentally that Abraham is called 'a prophet'), it assumes a regular organisation in the hands of Samuel, just when the earlier form of the theocratic government was passing away, and the monarchy was established. It grew up alongside the older institution of the Levitical priesthood without any professed or formal opposition to the latter, but playing a part distinct, and often practically opposed to it. The priests ministered at the altars of sacrifice, and discharged all the official rites of purification enjoined by the Jewish law. They were only secondarily teachers of the people. The prophets, again, while joining in the rites of the tabernacle and temple, were primarily and mainly teachers. Their function was moral, and not ritual; they upheld the ethical, spiritual, and eternal side of religion, apt to be obscured under the hardening tendencies and ambitious officialism of an influential priesthood. They were the great preachers of a righteous government of the world, and of future retribution amidst the confusions and evils of their time; and prophecy was the ever-renewing and reforming element in the constantly corrupting and decaying policy of Judaism. More particularly, the prophets were both the national historians and poets of the Jewish people, the narrators of its past deliverance, the heralds of its coming glories. The books of Joshua, Judges, Samuel, and Kings, are included among the prophetic books of the Old Testament in the Jewish canon; while the acts of David by Gad and Nathan, of Solomon and Jeroboam by Nathan and Iddo, along with other historical and biographical pieces, have unhappily perished. It is needless to point to the splendid collection of the later prophetic books, beginning with Joel, as containing, along with much direct historical matter also, the most exalted specimens of poetry to be found in any language.

But that which by many has been supposed to be the distinctive character of prophecy, and the special function of the prophets, remains to be noticed. According to the general view of theologians in modern times, prophecy is peculiarly *predictive*, and the essential characteristic of the prophet is supposed to be the power of *foretelling future events*. This view is not warranted, we have seen, either by the etymology of the word, or a comprehensive survey of the facts; but it is, nevertheless, undeniable that the Hebrew prophets directed their attention especially to the future, and 'made predictions concerning the fortunes of their own and other countries, which were unquestionably fulfilled.' 'There can be no reasonable doubt, for example,' writes one of the most liberal of modern theologians, 'that Amos foretold the captivity and return of Israel, and Micah the fall of Samaria, and Ezekiel the fall of Jerusalem, and Isaiah the fall of Tyre, and Jeremiah the limits of the captivity. It was the distinguishing mark of the Jewish people,' adds the same writer, 'that their golden age was not in the past, but in the future; that their greatest hero (as they deemed him to be) was not their founder, but their founder's latest descendant. Their traditions, their fancies, their glories, gathered round the head, not of a chief, or warrior, or sage that had been, but of a king, a deliverer, a prophet, who was to come. Of this singular expectation, the prophets were, if not the chief authors, at least the chief exponents.'* The reality of a succession of Messianic predictions, is admitted by even very advanced theologians; and the more usual opinion, it is well known, regards

* Dean Stanley, *Jerish Church*, vol. i. p. 464.

create the idea, that it is possible for more than one kind of proportion to subsist. *Continued proportion* indicates a property of every three consecutive or equidistant terms in a 'Geometrical Progression' (q. v.)—for instance, in the series 2, 4, 8, 16, 32, . . ., 2:4::4:8, 4:8::8:16, &c., or 2:8::8:32, &c. In the above remarks, all consideration of *Incommensurable Quantities* (q. v.) has been omitted.—The definition given by Euclid is as follows: Four magnitudes are proportional, when, any equimultiples whatever being taken of the first and third, and any whatever of the second and fourth, according as the multiple of the first is greater, equal to, or less than that of the second, the multiple of the third is also greater, equal to, or less than that of the fourth.—i. e., A, B, C, D are proportionals, when, if mA is greater than nB , mC is greater than nD ; if mA is equal to nB , mC is equal to nD ; if mA is less than nB , mC is less than nD ; m and n being any multiples whatever. The apparent cumbrousness and circumlocution in this definition arise from Euclid's endeavour to include incommensurable quantities; throwing them out of account, it is sufficient to say that four magnitudes are proportional, if, like multiples being taken of the first and third, and like of the second and fourth, when the multiple of the first is equal to the multiple of the second, the multiple of the third is equal to the multiple of the fourth. Abundance of illustrations of the general definition will be found in the Fifth Book of Euclid, and of the particular one in the notes appended to some of the later editions of the same work; it will be sufficient here to give an arithmetical instance of the working of the particular definition. Taking the four numbers of a previous example—12, 3, 8, 2; of 12 and 8 take multiples by 4, and of 3 and 2 by 16, then 12×4 (the multiple of the first) = 3×16 (the multiple of the second), and 8×4 (the multiple of the third) = 2×16 (the multiple of the fourth). In this example, the two multiples were so taken that the multiple of the first would be equal to the multiple of the second, and when it was found that the multiple of the third was also equal to the multiple of the fourth, the proportionality of the four numbers was established.

PROPOSITION. This is the technical name for the final constituent, or ultimate element, of whatever we call knowledge—what we can believe or disbelieve. 'Fire melts wax;' 'the harvest is good;' 'Rome stands on the Tiber;' 'the moon is not inhabited'—are propositions. All information, whether historical, scientific, or practical, may be resolved at last into simple statements such as these; and all such statements are propositions. In every proposition, there are two parts: something spoken about, called the Subject; and something said, affirmed, or declared of what is spoken about, called the Predicate. In the first example given, 'Fire' is the subject, 'melts wax' is the predicate or affirming part, to which a verb is necessary. In the second example, 'Harvest' is the subject, 'is good' the predicate. But sometimes this last part is resolved further into Predicate (good) and Copula (is). The predicate then simply means the quality or fact affirmed, while the copula gives the affirmation. In the previous case, the copula is contained in the predicate (melts).

Propositions are *affirmative* or *negative*, according as we declare that a thing is, or that it is not; 'the moon is (not) inhabited.' As some propositions contain the form of a condition, and some the form of an alternative, these are called *hypothetical*, in opposition to which the rest are called *categorical*. If A is B, C is D, is the *conditional* form of the

hypothetical class. Either A is B, or C is D, is called the *disjunctive* form.

Propositions are further divided, according to their quantity, or according to the extent of the subject, into *universal*, *particular*, *singular*, and *indefinite*: 'all the moving powers are originally derived from the sun' (universal); 'some men are wise' (particular); 'Socrates is wise' (singular). The 'indefinite' means the uncertain or ambiguous in form, as 'wine is good'; many of this form are known to be universal, as 'man is mortal'.

In inquiring into the ultimate import or meaning of propositions, Mr John Stuart Mill has come to the conclusion that they fall under five classes, distinguished according to the nature of the quality predicated. The five universal and comprehensive predicates are—Existence, Co-existence (sometimes taking the form of Order in Place), Succession (Order in Time), Causation, Resemblance. Every fact, or piece of information, consists in the affirmation of some one of these five general attributes. Existence by itself expresses a very limited class, since we usually specify circumstances of time, place, &c., in the same assertion: 'There is an ether for conveying light and heat,' is a proposition of Existence; but it would be more usually stated as having locality (Order in Place, or Co-existence), 'an ethereal medium is diffused over all space.' Existence is the only one of the five attributes that can be affirmed of one thing; all the rest require at least two things. The attribute of Co-existence appears in a very large number of propositions: all geographical statements and local descriptions; all the natural conjunctions of properties (the animal frame consists of digestive organs, a nervous system, &c.), affirm co-existence. The attribute of Succession is seen in history, and in all the changing aspects of things. The attribute of Causation is a special case of Succession, so important as to be raised to the rank of a first-class predicate. The facts of physical and mental science involve not merely succession, but cause and effect: 'Heat expands bodies;' 'practice improves the human faculties.' The concluding attribute—Resemblance—is of very wide occurrence. The propositions of numerical or mathematical science all involve some assertion of equality or inequality, proportion or disproportion: 'Twice three is (equal to) six;' 'triangles in the same base and between the same parallels are equal.' Throughout all our knowledge, the affirmation of likeness, or of unlikeness, is a fundamental fact; but, in mathematics, it constitutes the characteristic predicate, or the sole affirmation.

PROROGATION, the continuance of parliament from one session to another. Parliament is prorogued by her Majesty's command, signified in her presence by the Lord Chancellor, or Speaker of the House of Lords, to both Houses, or when her Majesty is not personally present, by writ under the Great Seal, or by Commission. Prorogation not only suspends all business, but quashes all proceedings pending at the time, except impeachments by the Commons, and writs of error and appeals before the House of Lords. A bill must be renewed after a prorogation, as if it had never been introduced. A prorogation for a single day has sometimes been resorted to, to enable a bill to be brought in a second time, it being a rule that no second bill of the same substance with a prior one can be introduced in the same session. Thus parliament was prorogued by William III. from the 21st to the 23d of October 1689, in order to renew the Bill of Rights, regarding which a difference had arisen between the Upper and Lower House that was fatal to it. By 37 Geo. III. c. 127, after parliament has been prorogued

the proceeding is carried on to trial; but if there is not sufficient evidence, the prisoner is ordered to be at once discharged. The entire expense of prosecuting crime in Scotland, whether at the higher or local tribunals, is borne by the public; the persons specially injured having nothing whatever to do in the matter except to appear as witnesses when called upon. This system has worked for three centuries with entire satisfaction.

PROSELYTES (Gr. *proselytos*, one who comes from without, a stranger; Hebr. *Gerim*) was the name given by the Jews to those heathens who became converts to Judaism. There were two kinds of proselytes distinguished: 'Proselytes of the Gate,' that is, heathen strangers, who, in order to be allowed to reside in Palestine, had undertaken to submit to the 'Seven Commandments of the Sons of Noah,' that prohibit blasphemy, idolatry, murder, incest, theft, disobedience to the authorities, and the eating of flesh with the blood on it: commandments which probably had grown out of certain restrictions originally put upon the 'strangers' by the Mosaic Law (Exodus, xii. 19; xx. 10, &c.). These 'Proselytes of the Gate,' or 'Sojourners,' could not claim all the privileges of an Israelite, could not redeem their first-born, and, at a later period, were not allowed to live in Jerusalem; yet they were permitted to offer whole burnt-offerings, and otherwise contribute towards the religious wants of the commonwealth. The second class of proselytes was formed by the *Gere hâtsedek* (Pious Proselytes), or *Gere haberith* (Proselytes of the Covenant). These accepted all the dogmas and customs of Judaism to their fullest extent, and were called 'Complete Israelites.' The new candidates were first strictly asked for their motives, and the classification of those who were not to be admitted runs as follows: those whose motive is love (husband for the sake of following his wife's faith, or *vice versâ*); Proselytes of the Tables of the Kings (i. e., those who covet court-favour); Esther-Proselytes (who wish to escape some threatening danger, cf. Esther, viii. 7); and Lion-Proselytes (those who, from a superstitious fear, wish to enter Judaism, like the Samaritans, 2d Kings, xvii. 26). If, on the other hand, the motives were satisfactory, the candidate was further cautioned against attaching himself to a persecuted people, and warned that sufferings of all kinds would be his lot in this life. If all this did not deter him, he was 'brought under the wings of God.' He was fully instructed in the religion and history of the people, and shewn the special Providence that guided them and watched over them. If a male, he was circumcised, and, in case of his being circumcised already (for instance, if he belonged to another nation practising this rite), a few drops of blood were drawn 'from the blood of the covenant,' a special prayer was said for him, and a new name was given to him, while for that of his father, Abraham was substituted. After the healing of the wound, Baptism (Tebilah) followed, and he had further to offer up a Sacrifice (Korban). Females had likewise to undergo baptism and to bring a sacrifice. All natural relations were then cancelled, the Proselyte was considered like 'a new-born child,' and the Holy Ghost was supposed to come upon him.

The desire to proselytise, which became strong among the political leaders during the Maccabean period, and which led to the 'bringing into the Congregation' of entire nations, such as the Idumeans under John Hyrcan, the Iturians under Aristobulus, contrasted strongly and most characteristically with the utter contempt in which the new-comers were held by the people, and with the suspicion with which they were regarded, and

their (after all) limited social rights and ambiguous position. The Talmud speaks of them in no measured terms, and there is no doubt that, on the whole, they must have acted a very dubious part. They were called the Leprosy of Israel; it was the Proselytes and other reprobates who stood in the way of the coming of the Messiah; and up to the twenty-fourth generation were they to be distrusted. Yet, notwithstanding all this, conversions were very frequent, especially among the better classes—and here, again, among women principally—in Damascus, Greece, Asia Minor, Rome; so much so, that even the Roman legislation was compelled, in the 1st c. A.D., to provide for cases of Judaisers. It is a curious fact, worth remembering, that one of the main features of the times of the Messiah was to be, according to Jewish tradition, the utter abolition of proselytism, and the entire ceasing of all distinctions of an opprobrious nature among men. The evil repute into which the term Proselyte had fallen in the times of Christ also caused the early converts to Christianity to adopt the name of Neophytes (newly planted) instead.

PROSERPINA, the Latin form of the Greek **PERSEPHONE** (also **PERSEPHATTA**, **PERSEPHASSA**, **PEREPHASSA**; in Homer, **PERSEPHONEIA**), was, according to the common myth, the daughter of Zeus and Demeter (Ceres) or of Styx. The story of her abduction by 'gloomy Dis,' while gathering flowers on the plains of Enna, in Sicily, in company with Artemis and Athena, does not occur in Homer, who simply represents her as the wife of the king of Hades, and as the majestic queen of the Underworld—a subterranean Hera (Juno). It is first given by Hesiod, and is manifestly an allegory of the seasons. See **CERES**. In the mystical Orphic Hymns, P. appears as the all-pervading goddess of nature, who produces and destroys everything, and she has been mixed up and identified with other mystical goddesses, Rhea, Artemis, Hekate, &c. She was generally worshipped under the name of *Kore*, 'maiden,' along with her mother Demeter. The chief seats of her worship were Sicily and Magna Græcia; but she had also temples at Corinth, Megara, Thebes, and Sparta. In works of art, P. is represented sometimes as the grave and earnest spouse of Pluto, sitting on a throne beside her sombre husband, with a sceptre and a little box; but more frequently as a blooming virgin, the picture of her mother, in the act of being carried off to Hades.

PRO'SODY (Gr. *prosôdia*, literally, 'belonging to song or hymn') is the name given, both by the ancients and moderns, to that part of grammar which treats of the rules of rhythm in metrical composition. See **METRE**, **RHYME**, **BLANK VERSE**.

PROSPECT, in Roman Law, was recognised as a legal incident of a house, or an urban servitude, so that no adjoining owner was entitled to obstruct the prospect or view of a man's house. But if this meant more than that the light should not be sensibly obstructed, it is not recognised in English or Scotch law. See **LIGHT**.

PRO'SSNITZ, a manufacturing town of Austria, in Moravia, in the fruitful plain of Hanna, stands on the Rumza, 12 miles south-west of Olmütz. It contains a convent, and a linen, and several cloth factories. Brandy is extensively distilled. Pop. 11,400.

PROSTITUTES, **LAW AS TO**. It is not an offence, in this country, for a person to carry on a course of prostitution in his or her own person; but when others are incited, or forced to that course, it may become so, in certain circumstances. Thus,

for a person to keep a disorderly house, is an indictable offence, which is punishable by fine and imprisonment, and the parish officers in England are bound to institute the prosecution, the expenses of which are paid out of the poor-rates. It is, however, only the person who keeps the house who is punishable, and no punishment can be imposed on the frequenters of the house in any circumstances. The law may be said to be passive so far as the mere fact of prostitution or immoral intercourse is concerned, and gives neither party any remedy against the other, civil or criminal, arising out of that state of the relations between man and woman. Thus, if a man give a woman a bond, providing her an annuity in consideration of her living with him in concubinage, the law will not enforce it, because it is an immoral consideration. So, if a woman take lodgings, or buy dresses, for the purpose of carrying on a course of prostitution, the law will not enforce the payment of rent, or the price of the goods sold, because the tendency is immoral. In some countries, as in France, the law takes direct cognizance of the fact of prostitution, and deals with prostitutes for various sanitary purposes; but in this country, the subject was entirely ignored, except indirectly in the cases above-mentioned, and until 1864, when a statute was passed, which to a certain extent introduced the French procedure. The statute 27 and 28 Vict. c. 85, applied only to certain naval and military stations—viz., Portsmouth, Plymouth, Woolwich, Chatham, Sheerness, Aldershot, Colchester, Shorncliffe, the Curragh, Cork, and Queenstown, but not to Scotland. In those places a justice of the peace may now, on information, order a woman to be taken to a certified hospital for medical examination; and if she is found to have a contagious disease, she may be detained in the hospital for medical treatment during not more than three months. A woman who refuses to submit to examination, or leaves the hospital without being duly discharged, is liable to be imprisoned for one or two months; and occupiers of houses alluring prostitutes to frequent their houses when having a contagious disease, incur a penalty of £10, or three months' imprisonment.

PROSTYLE. A temple with a portico in front. When it had a portico at both ends, it was termed amphiprostyle.

PROTAGORAS, the Greek Sophist, was a native of Abdera, where he was born of humble parentage, probably about 480 B.C. He was the first who took the name of 'Sophist,' or taught for pay. When he went to Athens, is not precisely known; but he is conjectured to have gone thither about the middle of the century, and he seems to have enjoyed the friendship of Perikles. Accused of atheism by one of his own scholars, he was banished from Athens, and his writings were ordered to be publicly burned. He died, probably in 411 B.C. The basis of his speculation is the proposition, that 'man is the measure of all things,' which was developed by him in a way that involved the most thorough-going scepticism. The *Theatetus* and *Protagoras* of Plato are devoted to a refutation of P.'s doctrines, which, as delineated by the great philosopher, appear shallow, confused, and untenable. All P.'s works are lost, though some were extant as late as the time of Porphyry.

PROTEACEÆ, a natural order of exogenous plants, containing about 650 known species of shrubs and small trees, chiefly natives of South Africa and of Australia, and forming a remarkable feature of the vegetation of these regions. Some of them, as species of *Protea* and *Banksia* (q. v.), are frequently

cultivated in gardens and greenhouses, being prized for their singular and elegant appearance, and their curious and often beautiful flowers. They have usually umbellate branches; their leaves are evergreen, and remarkably hard, dry, and woody, divided or undivided, and without stipules. The perianth is four-leaved or four-cleft; the stamens, four, one of them sometimes sterile, perigynous, opposite to the segments of the perianth; the ovary superior, consisting of a single carpel; with one, two, or many ovules; the style simple, the stigma undivided; the fruit dry or succulent, and opening or not opening, many fruits often collected in a kind of cone. The timber of some of the larger species is used for various purposes; others supply much of the firewood of the Cape of Good Hope and Australia. The nuts or seeds of some are eaten, as those of *Brabejum stellatum* in South Africa, and of *Guevina Avellana* (also called *Quadrifida heterophylla*) in Chili. Those of the latter are much esteemed, and are called *Avellana* and *Nebu*.

PROTECTION—PROTECTIVE DUTY, in Political Economy, terms applied to a practice, now in disuse in Britain, of discouraging, by heavy duties and otherwise, the importation of foreign goods, under the notion that such a practice increased the prosperity of the country at large. See **FREE TRADE**.

PROTECTOR, a title which has sometimes been conferred in England on the person who had the care of the kingdom during the sovereign's minority. The Earl of Pembroke was Protector in 1216, in the minority of Henry III. Humphry, Duke of Gloucester, held the same office in the minority of Henry VI., from 1422 to 1447. Richard, Duke of Gloucester, was Protector in 1483, prior to his ascending the throne as Richard III. The Duke of Somerset, one of King Henry VIII.'s sixteen executors, was in 1548 constituted Protector during the minority of Edward VI., with the assistance of a council, consisting of the remaining fifteen executors; a dignity, however, which he enjoyed but a few months. Oliver Cromwell, in December 1653, took the title of Lord Protector of the Commonwealth of England, Scotland, and Ireland. In 1658, his son Richard succeeded to his title and authority, but was never formally installed in the Protectorate, which he resigned in the following year.

PROTEIN AND THE PROTEIN BODIES. Under the term *Protein Bodies*, chemists include the following substances: Albumen, Fibrin, Syntonin or Muscle-fibrin, Casein, Globulin, and Hæmatocrystallin. Albumen, fibrin, and casein are common both to the animal and vegetable kingdom; while the three others occur only in the animal kingdom (namely, in muscular tissue, in the crystalline lens of the eye, and in the blood-cells). The most careful analyses have shewn that in their composition, these substances are almost identical, and that they all contain about 53·6 per cent. of carbon, 7·1 of hydrogen, 15·6 of nitrogen, and 22·1 of oxygen, with a varying quantity of sulphur not exceeding 1·6 per cent. These substances are as similar in many of their properties, and in the products of their decomposition, as in their ultimate composition, and hence chemists were naturally led to entertain the view that they possessed a common radical. Mulder (q. v.) announced, in 1833, that he had discovered this radical, which, from its importance, he named **PROTEIN** (Gr. *proteuo*, I hold the first place), and that he had found that albumen, fibrin, casein, &c. (which at that period were known as the *albuminous bodies*, the *albuminoid group*, or the *albuminales*), were combinations of

this protein with sulphur and phosphorus, or simply with sulphur. The composition of this protein is represented according to the discoverer, by the formula $C_{10}H_{12}N_2O_{10}2HO$. Liebig and several of his pupils have, however, shewn that Mulder's protein always contains a small but variable amount of sulphur; and they deny, on what are generally deemed sufficient grounds, the existence of protein as a separate body. The term *protein bodies*, or *protein compounds*, is, however, commonly retained both by physiologists and chemists, as being the most convenient one for representing a class of compounds, which, whether Mulder's theory is correct or not, deserve their name from their constituting the group which form the most essential articles of food.

The *PROTEIN BODIES* may be generally described as nearly colourless, neutral, nitrogenous bodies, soluble in potash solution, and not yielding gelatin when boiled with water. They all present two modifications, differing essentially from one another; in one of which they are soluble, and in the other nearly or quite insoluble. They exist naturally only in the soluble modification, although not necessarily in a state of solution. Most of them are transformed into the insoluble state by boiling, by the mineral acids, and by numerous salts; and one of them, fibrin, undergoes this modification on simple removal of the blood, or other fluid containing it, from the organism. This passage from the soluble into the insoluble form, is termed *coagulation*, but we do not know what chemical change takes place in the process.

The *soluble protein bodies*, in their dried state, form pale yellow, translucent masses, devoid of smell and taste, which are soluble in water, but insoluble in alcohol and ether. They are precipitated from their watery solutions by alcohol, by the mineral acids, by tannic acid, but not by the vegetable acids generally; and by many mineral oxides and salts. The *insoluble protein bodies*, when freshly precipitated, are of a white colour, in flakes or small clots, or viscid and glue-like; when dried, they may be reduced to a whitish powder.

The products of the decomposition of the protein bodies are very numerous, and the study of these products is of great importance, as tending to elucidate the changes which the tissues undergo in the body during their disintegration.

PROTEST is in law a legal document, drawn up by a notary-public, giving notice of some act of a public nature, as the protest of a bill of exchange.

PROTESTANT, a term first applied to the adherents of Luther, from their protesting against the decrees passed by the Catholic states at the second diet of Speier in 1529. This decree had forbidden any further innovations in religion, and enjoined those states that had adopted the Reformation so far to retrace their steps as to reintroduce the Mass, and order their ministers to avoid disputed questions, and to use and explain the Scriptures only as they had hitherto been used and explained in the church. The essential principles involved in the protest, and in the arguments on which it was grounded, were: 1. That the Catholic Church cannot be the judge of the Reformed churches, which are no longer in communion with her. 2. That the authority of the Bible is supreme, and above that of councils and bishops. 3. That the Bible is not to be interpreted and used according to tradition or use and wont, but to be explained by means of itself—its own language and connection. As this doctrine, that the Bible, explained independently of all external tradition, is the sole authority in all matters of faith and discipline,

is really the foundation stone of the Reformation, the term Protestant was extended from those who signed the Speier protest, to all who embraced the fundamental principle involved in it; and thus Protestant churches became synonymous with Reformed churches. The essence of Protestantism, therefore, does not consist in holding any special system of doctrines and discipline, but in the source from which, and the way in which it proposes to seek for the truth in all matters of faith and practice; and thus a church might, in the progress of research, see reason to depart from special points of its hitherto received creed, without thereby ceasing to be Protestant. The Symbols or Confessions of the Protestant churches were not intended as rules of faith for all time, but as expressions of what was then believed to be the sense of Scripture. When, at a later time, it was sought to erect them into unchangeable standards of true doctrine, this was a renunciation of the first principle of Protestantism, and a return to the Catholic principle; for, in making the sense put upon Scripture by the Reformers the standard of truth, all further investigation of Scripture is arrested, the authority of the Reformers is set above that of the Bible, and a new tradition of dogmas and interpretation is created, which differs from the Catholic tradition only in beginning with Luther and Calvin, instead of with the apostolic fathers. See REFORMATION.

PROTEUS, in the Homeric or oldest Greek mythology, appears as a prophetic 'old man of the sea' (*haios geron*), who tends the seal-flocks of Poseidon (Neptune), and has the gift of endless transformation. His favourite residence, according to Homer, is the island of Pharos, off the mouth of the Nile; but according to Virgil, the island of Karpethos (now *Skarpanto*), between Krete and Rhodes. Here he rises at mid-day from the floods, and sleeps in the shadow of the rocky shores, surrounded by the monsters of the deep. This was the time when those who wished to make him prophesy sought to catch him. But it was no easy task. P., unlike most vaticinal personages, was very unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavours hopeless, he resumed his proper form, and then spoke out unerringly about the future.

PROTEUS, a genus of perennibranchiate Batrachia (q. v.), having a long, smooth, naked, eel-like body; four small and weak legs; the

Proteus (P. anguiformis).

fore-feet three-toed—the hinder, four-toed; the tail compressed and forming a kind of fin; the head lengthened and flattened; the eyes extremely small, and covered by the skin; the ears concealed in the flesh; the gills external and permanent, reddish, very conspicuous, between the head and the fore-legs. Notwithstanding the permanent external

called the College of Notaries, who are to be distinguished from honorary or extraordinary apostolic notaries. The former are said to date from a very early time, and are charged with the official registration of all the solemn acts of the pope, whence they have a very special duty in relation to canonisations of saints, &c. Their number was fixed by Sixtus V. at twelve, and they enjoy many privileges. An apostolic notary-extraordinary, although called proto-notary, does not enjoy the same privileges. The proto-notary extraordinary may be named not only by the pope, but also by a LEGATE (q. v.), and under certain restrictions, by the Roman College of Notaries.

PROTOPHYTES (*Protophyta*, Gr. first plants), a name now frequently employed to designate the lowest or simplest organisms in the vegetable kingdom, corresponding to the *Protozoa* of the animal kingdom. They are regarded as among the *Algae* (q. v.). Many of them are mere simple cells, which multiply by division, although perhaps they may yet be found to have also another mode of reproduction; others consist of cells united by a gelatinous substance, and the aggregate in some is a shapeless mass; in others, a plant-like structure, the form resulting from the mode in which the division of cells takes place. In none of them do the cells assume determinate characters in any part of the structure, so as to constitute different organs; in which they differ from all higher plants. It is sometimes very difficult to distinguish P. from *Protozoa*; and perhaps the surest distinctive character is the nature of their food. Some of the *Protozoa*, having no mouth, as the *Proteus* or *Amœba*, might be regarded as plants rather than animals; but they subsist by consuming organic particles, vegetable or animal, whilst P. live by appropriating inorganic substances, chiefly from the air or water around them. Among the P. are *Palmellaceæ* (q. v.).

PROTOPLASM. See **CELLS**.

PROTOZOA (Gr. *proton*, first, and *zōon*, animal), constitute the lowest animal subkingdom, and include a large number of animal beings of the lowest and simplest type of organisation. Their bodies consist either of a simple cell or of an aggregation of cells, each of which seems to retain its independent existence. In none of the P. can a nervous system, or organs of sense, be detected; and except in one group (the *Infusoria*), there is no trace of a mouth. Excepting the sponges, they are generally of very minute size, and only to be observed with the microscope; and excepting a few that inhabit the bodies of other animals, all are aquatic animals. They generally present the appearance of a transparent gelatinous cell, containing a nucleus; in addition to which, one or more clear pulsating spaces, termed *contractile vesicles*, may be frequently seen. Excepting the infusoria, none present true reproductive organs, reproduction being usually accomplished by fissure. They are divisible into the following groups or classes, each of which is noticed in a separate article: (1) *Gregarinidæ*, (2) *Rhizopoda*, (3) *Spongiæ*, and (4) *Infusoria*; to which Green, in his *Manual of Protozoa*, adds *Polycystina*, and *Thalassicollidæ* (both of which are commonly included in the *Rhizopoda*).

PROUD-FLESH is the popular term for coarse and too luxuriant Granulations (q. v.) springing up on wounds or ulcerated surfaces. Such granulations must be treated with nitrate of silver or sulphate of copper, either in the solid form or in strong solution.

PROUDHON, PIERRE JOSEPH, a noted French publicist and speculator on social and political

subjects, was born July 15, 1809, at Besançon, in which town his father was a poor cooper. Through the good offices of charitable friends, he received the rudiments of his education at the college of his native place, and from the first gave great promise of talent. While still very young, however, he quitted the institution in order to aid his family, which had fallen into great distress, and sought employment in a printing establishment. Here he was noted for the most punctual discharge of duty; and in the hours not occupied in work, he contrived, by a rare exercise of resolution, to complete and extend his education. In 1830, he declined an offer of the editorship of a ministerial journal, preferring an honourable independence as a workman, to the career of a writer pledged to the support of authority. He became partner in 1837 with MM. Lambert and Maurice in the development of a new typographical process; was engaged on an edition of the Bible, to which he contributed notes on the principles of the Hebrew language; and in 1838, published an *Essai de Grammaire Générale*; in approval of which, a triennial pension of 1500 francs was awarded to him by the Académie de Besançon. On this accession of funds, he paid a visit to Paris; and subsequently contributed to the *Encyclopédie Catholique* of M. Parent Desbarres the articles *Apostasie*, *Apocalypse*, and others. In 1840, he issued the work entitled *Qu'est-ce que la Propriété?* which afterwards became so famous. The nature of the doctrine announced in it is sufficiently indicated in its bold paradox, soon to be widely popularised—*La Propriété, c'est le Vol*. At the moment, it attracted little notice; and the sole results to its author were the withdrawal of his pension by the Academy, on the score of his noxious opinions, and the threat of a prosecution, which, however, was departed from, at the instance of M. Blanqui, the political economist, to whom reference in the matter was made. In 1842, for a repetition of offence in his *Avertissement aux Propriétaires*, he actually was prosecuted before the Cour d'Assises of Besançon, but succeeded in obtaining an acquittal. From 1843 to 1847, P. was employed at Lyon, under MM. Gauthier, in the superintendence of a scheme of water-transport on the rivers Saône and Rhône; publishing during this time at Paris the two works entitled *De la Création de l'Ordre dans l'Humanité*, and *Système des Contradictions Economiques*.

With the outburst of the Revolution of February 1848, the opportunity of P. had arrived. He instantly repaired to Paris, and on the 1st of April, he came before the public as editor of the *Représentant du Peuple*, instantly, by his fierce and vigorous advocacy of extreme democratic and socialistic opinions, making his mark as a leading figure of the hour. His paper was suppressed in August following; but meantime, on June 4, no less than 77,094 enthusiastic admirers had voted him into the Constituent Assembly as representative of the department of the Seine. His career as a senator, if brief, brought him at least notoriety. *La Propriété, c'est le Vol*, though a maxim much commending itself to the moral sense of the hungry masses, naturally failed to find like acceptance with an audience mostly with some sous in the pocket. P. soon ceased to address the Assembly, for, so soon as he ascended the tribune, the indignant roar which saluted him rendered audible speech impossible. Under these circumstances, P. once more betook himself to his pen, and, as editor of three daily journals in succession, avenged himself on the adversaries who declined *vox* to listen to him, the chief victims of his savage personalities being MM. Ledru Rollin, De Lamartine, Louis Blanc, Considérant, Cavaignac, &c. All three papers—the *Peuple*

were for the most part imported into Hellas, thence to Rome, and from thence they were scattered all over Europe, and partly brought back again, slightly altered, to the East. Even certain Jewish proverbs quoted by Christ and the apostles, which hitherto did not seem to offer any analogy in other languages, might be traced back to India, where they had existed for many long centuries before they found their way into the popular speech of Palestine and Babylonia, and thence into the Talmud. That the names of their authors should, as a rule, be lost, is not surprising; yet we do meet with single instances in which either the author of a proverb is well known, or others whose nationality and birthplace are easily recognised. In the former case, it is generally some memorable event in a celebrated man's life which is remembered in close connection with a certain striking sentence he then uttered. In the latter, the scenery, the circumstances, the history of a special country, may so unmistakably be pointed, that they leave no room for any doubts on the birthplace of the special proverb; and more than that, even the special period which gave it birth, may be recognised by some trace of its character, manners, fashions, and occupations. 'What is nearest and dearest to the heart of a nation, the aspect under which they contemplate life, how honour and dishonour are distributed among them, what is of good or of evil report in their eyes,' as a recent writer has it, will surely be apparent in their national proverbs. Thus, for instance, the Greek proverbs may be designated as being fraught with a thorough knowledge of their own mythology, poetry, and history, bearing testimony to the high intellectual training that ran through all classes. The Roman ones—fewer in number, as far as they are the genuine growth of their own soil—have much less poetry about them, and are also deficient in the refinement and delicacy which were indigenous to Hellas. On the other hand, the character of the people comes well out in the constantly reiterated lessons of frugality, patience, perseverance, independence they inculcate; the practical hints as to marriage, education; and the various pursuits of that busy, vigorous, energetic nation—and among which agriculture played a prominent part. Of the proverbs now in use among European nations—calculated at about 20,000—the Spaniards are supposed to have a very large, if not the largest proportion. They may be recognised by a certain *grandezza*, a stateliness and thoughtfulness, blended though they be with humour and irony; and by the spirit of chivalry, honour, and freedom with which they are filled. The Italian proverbs, which come next as to quantity, are, to a certain extent, replete with a certain shrewdness and selfishness; and while they are fraught with unbridled passion, teach doctrines of cynicism and general distrust; yet, on the other hand, there are many of the noblest stamp, of a delicate refinement of beauty, of a subtle wisdom, teaching honour and honesty, plain-dealing and uprightness. In the same way, the French, the German, the English, as well as the Chinese and the Hindus, and every nation under the sun, impart a certain distinctive type and stamp to their homely sayings, which tells a distinct tale respecting their own inner life and national peculiarities. Of the Scotch proverbs, of which Kelly collected 3000, it has been said that there is a shrewdness, although deficient in delicacy, about them; that they are 'idiomatic, facetious, and strike home.'

Of the general utility of the proverb, it is needless to speak, after what we have said; we will only adduce the well-known frequent use made

of them for ethical purposes in Scripture, which contains an entire book of them, ascribed, for the greater part, to the Wise King himself; in the Midrash and Talmud, which contains, likewise, a whole collection of pithy sayings of the 'Fathers,' or Mishnaic teachers, and out of which several later collections have been compiled; in the patristic and later theological writers, who, like Luther, drew very largely upon these popular treasures.

Erasmus lays claim to be the first modern collector of proverbs, although Polydore Vergil, and not without a certain amount of truth, accuses him of plagiarism. His *Adagia* (Par. 1500) fired the learned in Europe with a desire to collect and to publish proverbs of their own countries. F. Nunez and the Marquis of Santellana edited Spanish *Refranes*; Florio, an Italian, *Giardino di Ricreatione* (1591); which was followed by the Italian collections of Angelus Monozini and Julius Varini. Ondin published French proverbs as *Curiosités Françaises*. The first real German (Nether-Saxon) collection is due to Johann Agricola, whose *Gemeine Sprichwörter* appeared in 1528. In England, Camden, Herbert, Howell, Fuller, Ray, Kelly, Bohn, and others; in Germany, Weber, Sailer, Nopitzsch, &c., have issued national collections. Freytag and Burkhardt published *Arabic Proverbs*; Dukes, a small collection of Neo-Hebrew proverbs, &c. Thus, it may easily be seen, there is by no means a lack of material; and yet very little has been done towards the investigation and elucidation of the numerous points of interest connected with this subject. Disraeli's *Curiosities of Literature* contain a valuable essay on the 'Philosophy of Proverbs,' from which (as also from Eiselein's *Sprichwörter und Sinnsreden*, 1840) Archbishop Trench has derived a great deal of information for his excellent little book, *On the Lessons in Proverbs*. Freytag's introduction to his collection of *Arabic Proverbs*, and that of Le Roux de Lincy to his French collection, make honourable exceptions to the general run of vapid prefaces to most modern collections.

PROVERBS, THE BOOK OF (Heb. *Mishle*, LXX. *Paromia Salomontos*, Vulg. *Proverbia*), a canonical book of the Old Testament, containing an anthology of gnomes and sentences, the fruit of reflections on the Mosaic law and on the divine guidance of the people of the Israelites. It is also called the 'Book of Wisdom,' in as much as it embraces the doctrines of the old covenant crystallised into religious maxims of thought, will, and action. Practical piety is enjoined under the name of 'Life,' while 'Death' represents sin throughout. The form of these proverbs is manifold—*similes*, *enigmas*, *theses* and *antitheses*, *wise sayings*, *gnomes*, *comparisons*, &c., vary constantly. The book is divided into three sections, to which the two last chapters form an appendix. The first section (chaps. i.—ix.) contains a description and a recommendation of Wisdom as the highest good obtainable, and is further subdivided into three portions. The second (x.—xxiv. 34) is equally in three portions, in the first of which the sentences are very loosely strung together; while, in the second, they are joined into more continuous utterances, sometimes running through several verses; and the third, which has the inscription: 'These, too, are of the wise men,' contains, again, some single sentences, principally in the form of commandments and prohibitions. The third section (xxv.—xxix.) is inscribed: 'These are also proverbs of Solomon, which the men of Hezekiah king of Judah copied out,' and is somewhat different from the former by the more predominant form of *theses* and *antitheses*, catch-words by which an association of ideas is produced, and *similes*. The

PROVOST (Lat. *propositus*, set over), in Church Law, the chief dignitary of a cathedral or collegiate church, from which use the title has also been transferred to the heads of other similar bodies, whether religious, literary, or administrative. Properly, however, the name is given to the highest dignitary in the metropolitan or diocesan chapter, and is often held conjointly with the archdeaconry. The provost is the next in dignity after the archbishop or bishop, a position which is also the right of the provost of a collegiate chapter. The name is also given to the superiors of certain religious houses of lesser rank, and the relation of which to the more important houses is analogous to that of the priory to the abbey. It was also given to certain lay officials, whose duties, in relation to the church and the maintenance of its material condition, were similar to those of the modern churchwarden. In the Protestant Church in Germany, the name provost is sometimes used as synonymous with that of dean or arch-priest; and occasionally, where several minor churches or chapels are attached to one chief church, the minister of the latter is called 'provost.'

In England, the heads of several colleges in the university of Oxford, and the head of King's College, Cambridge, are designed provost. The head of Eton College is also so called. The Provost of the Mint is a judge appointed to apprehend and prosecute false coiners.

In Scotland, the chief municipal magistrate of a city or burgh is called Provost, the term corresponding to the English word mayor. The provost presides in the civic courts along with the bailies, who are his deputies. The chief magistrates of Edinburgh and Glasgow are styled Lord Provost, and the same designation has long been popularly given to the Provost of Aberdeen, and his right to it, which has been contested by the Court of Session, seems lately to have acquired some sanction from royal usage. It has been said that the Provost of Perth, from having been on one occasion addressed by Queen Victoria as Lord Provost, is entitled to the same style. The Lord Provost of Edinburgh is entitled to the prefix 'Right Honourable,' which may be attached not merely to the name of his office, but to his Christian name and surname, a usage which probably originated in the circumstance, that the Lord Provost of Edinburgh was *ex officio* a member of the old Scots Privy Council. Within the city and liberties of Edinburgh, the Lord Provost takes precedence next after members of the royal family. The Lord Provost of Glasgow is generally styled the 'Honourable,' a prefix, however, which belongs only to his office, and cannot be attached to his name.

In France, there were formerly various descriptions of inferior judges, known under the name of provost (*prévôt*). The Grand Provost of France had jurisdiction in the king's house and over its officers.

PROVOST-MARSHAL, in the *Navy*, is a person appointed to have charge of a prisoner before a court-martial, and until the sentence of the court is carried into execution. In the *Army*, the provost-marshal is an officer, with the rank of captain, appointed to superintend the preservation of order, and to be, as it were, the head of the police of any particular camp or district. He has cognizance of all camp-followers, as well as of members of the army. His power is summary, and he can punish an offender, taken *flagrant delicto*, on the spot, according to the penalties laid down in the Mutiny Act.

PROW (from the Latin *prora*) means, generally,

the fore-part of a ship, or more especially the beak or pointed cut-water of a galley, polacre, or zebec.

PROXY (contracted for Procuracy), the agency of one person who acts as substitute for another. Every member of the House of Lords can (by licence, in theory supposed to be obtained from the sovereign) appoint another Lord of Parliament his proxy to vote for him in his absence. A spiritual lord can, however, only be proxy for a spiritual lord, and a temporal for a temporal lord, and no peer can hold more than two proxies at the same time. Proxies cannot be used in judicial cases, or where the House is in committee, nor can a proxy sign a protest.

PRUDENTIUS, AURELIUS CLEMENS, a Christian poet of the 4th c., was a native of Spain, and was born 348 A.D. Nothing is known regarding him except what he has himself told in a poetical autobiography prefixed to his works. From this we learn that he received a liberal education, was admitted to the Roman bar, practised as a pleader, discharged the functions of civil and criminal judge, and was ultimately appointed to a high office at the imperial court. The year of his death is not known. In his youth, P. was fond of pleasure, and very dissipated; but as he grew old, he became very devout, and his writings (which are all in Latin verse) reflect the latter phase of his character. The principal are—1. *Cathermerinon Liber* (Book [i.e., of hymns] for Daily Use), being a series of twelve hymns, the first half of which were reckoned by the author suitable for devotional purposes at different parts of the day; 2. *Apotheosis* (a defence of the doctrine of the Trinity against heretics); 3. *Hamartigenia* (On the Origin of Evil, a polemic, in verse, against the Marcionites); 4. *Psychomachia* (The Triumph of the Christian Graces in the Soul of a Believer); 5. *Contra Symmachum, Liber 1* (a polemic against the heathen gods); 6. *Contra Symmachum, Liber 2* (a polemic against a petition of Symmachus for the restoration of the altar and statue of Victory cast down by Gratian); 7. *Peri Stephanon Liber* (14 poems in praise of Spanish and other martyrs for the faith); 8. *Diptychon* (48 poems of four verses each, on Scriptural incidents and personages). Bentley calls P. 'the Horace and Virgil of the Christians,' which may be true enough if the critic only meant to say that P. is the first of the early Christian verse-makers; but is ridiculous if he intended to hint at a comparison with these masters of poetic elegance and grace.

PRUD'HOMMES, COUNCIL OF (from Latin *homo prudens*), municipal tribunals, which existed first in the middle ages at Marseille, Lyon, and perhaps elsewhere in France, exercising an equitable jurisdiction as arbiters of disputes between masters and workmen. Similar tribunals, under the same name, were reintroduced by Napoleon I. in 1806, and have been found of great practical utility. They now exist in two localities in France, Lyon and Paris. They were instituted in the former town in 1806, in favour of the silk-trade and other trades immediately connected with it. The council consists of manufacturers, mercers, master-workmen, foremen, dyers, and common workmen, elected among themselves. The council is empowered to dispose finally of all differences between manufacturers and their workmen, or between master-workmen, companions, and apprentices, where the sum in dispute does not exceed 200 francs; and it may also take cognizance, subject to an appeal to the Tribunal of Commerce or Tribunal of First Instance, of similar disputes, whatever their amount. Other functions of a miscellaneous nature belong to the Council of Prud'homes, including the inspection of the workshops, in order to obtain

information regarding the number of looms and of workmen, and the giving an opinion, when required by the administrative authorities, on any question submitted to it. In 1844, a Council of *Prud'hommes* was established in Paris in favour of the metal trade, and all trades connected with it; and three new councils of the same kind were instituted in Paris in 1847—one connected with the manufacture of tissues of all kinds, another with the manufacture of chemicals, and a third having jurisdiction in all other trades.

PRUNELLA, a genus of plants of the natural order *Labiata*, having the upper lip of the calyx 3-toothed, the lower lip bifid; the upper lip of the corolla arched and nearly entire; the lower lip 3-lobed; and four filaments, each with two teeth at the extremity, of which one bears the anther. Several species are natives of Europe; one only is found in Britain, *P. vulgaris*, popularly known as **SELF-HEAL**, a plant very frequent in moist and barren pastures, as it is also throughout most parts of Europe, Central Asia, North America, and New Holland. It has oblong-ovate stalked leaves, and violet-blue flowers, very densely whorled, so as to form an imbricated oblong spike. It was at one time in considerable repute as a febrifuge. It is mildly aromatic and slightly astringent.

PRUNES are dried fruit of the plum-tree (*Prunus domestica*), of the variety called *Juhiana*, which is so largely cultivated in France, that not only is that country supplied, but Britain also imports from thence over 400 tons per annum. They are much used in the manufacturing districts of England by the operatives, who make puddings and pies of them when fresh fruit is out of season. The very fine kind which are sold in highly ornamental boxes are called French Plums or Table P.; these are a much finer variety, viz. *Catherinea*, which are much larger, and, when ripe, are much sweeter. They are more carefully prepared, being gathered by hand, and separately dried. They are used chiefly as a dessert fruit. The imports of these into Britain amount to upwards of 200 tons per annum.

PRUNING, the removal of branches from fruit or forest trees, in order to the greater production of fruit, the improvement of the timber, or purposes of ornament. In pruning for ornamental purposes, taste must chiefly be consulted, but reference must be made to what has been too little regarded in pruning of every kind—the nature or habit of the tree itself. Some trees will bear clipping into fantastic forms, which would be utterly destructive of others. Such forms, once esteemed as the finest ornaments of a pleasure-ground, or the neighbourhood of a mansion, are rejected by the simpler taste of the present age, and the *topiarian art* has few admirers. Much may be done, however, by the removal of branches, to give a finer form to ornamental trees; but in this, as in the pruning of trees grown for the sake of their timber, a great mistake is very generally committed in permitting branches to grow to a considerable size before they are cut off. It may be accepted as a general rule, that the branches removed should be small in proportion to the whole bulk of the tree. The removal of twigs and small branches is attended by no bad effects, and may be beneficial; but the removal of large branches is dangerous. The leaving of stumps or snags is an aggravation of the evil. They rot away, and spoil the timber of the stem; indeed, a hole is not unfrequently formed. But as to forest trees, pruning may with great advantage be in great part avoided, by taking care to plant at proper distances, and thinning out the plantations sufficiently in early

periods of their growth. In this way, better timber is obtained, and a greater produce from the land. Pines and firs scarcely ever require pruning, and are probably in almost all cases the worse of that which they get, except in the removal of those lower branches which have actually begun to decay. In other trees, it is sometimes of importance to watch for branches that would divide the trunk, and to prevent the division, causing the main stem to ascend higher before it forms a crown; but to be of any use, this must be done whilst the branches are still very young. Plantations should therefore be examined with a view to pruning, at intervals of not more than two years, after they are six or eight years old.

In orchards and fruit-gardens, pruning is necessary, the object being not to produce timber, or the utmost luxuriance of trees, but fruit in the greatest perfection and abundance. The habits of each kind must be studied. Even in the pruning of gooseberry and currant bushes, regard must be had to natural diversities, the gooseberry and black-currant producing fruit chiefly on young wood, whilst the red and white-currant produce fruit chiefly on spurs from older branches. And so it is amongst trees; apricots, for example, producing fruit chiefly on young wood; cherries mostly on spurs, whilst plums produce both in the one way and in the other. The object of the gardener in pruning is to bring the tree into the condition best suited for producing fine fruit and in the greatest abundance; and to this the training of Wall Trees (q. v.) must also be accommodated. Sometimes, in order to produce particularly fine fruits for the improvement of the variety by seed, or for the sake of a prize at a horticultural exhibition, the gardener diminishes the number of branches likely to bear fruit, beyond what would otherwise be desirable.

The general seasons of pruning are winter and spring; but some trees, particularly cherries, are advantageously pruned in summer, as they then throw out less gum.

Pruning instruments are of various kinds—knives, axes, saws, bills of very various forms, &c., and the *avuncator*, which may be described as a pair of scissors, one blade hooked or crooked, attached to a long handle, and working by a cord and pulley. It is scarcely used except for standard trees in gardens and orchards.

PRUNUS. See **PLUM**.

PRURIGO is a non-contagious affection of the skin, in which intense itching is the most prominent symptom. Sometimes the parts affected present no marked deviation from the normal type, but most commonly they are covered with papules, which are nearly of the same colour as the skin. Hence *P.* has been placed among the papular diseases of the skin. William makes three varieties of this disorder—viz. *P. mitis*, *P. formicans*, and *P. senilis*. This affection seldom affects the whole surface; its favourite seats being the neck, the shoulders, the back, the outer surface of the limbs, the anus, &c. In *P. formicans* there is not only intense itching, but patients complain of a feeling like the creeping of ants (hence the specific name) or the stinging of insects, or as if hot needles were thrust into the skin. All the forms of this disease are aggravated by exposure to the air, and by heat, and the sensations are often so distressing after the patient has become warm in bed, as to prevent sleep for many hours. *P. senilis*, occurring, as its name implies, in old persons, is characterised by the extreme severity and permanence of the itching, and by the obstinacy with which it resists every kind of treatment. The different varieties of this disorder may probably be

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often traced either to disease of the digestive system, or to want of personal cleanliness; but in most cases their origin is obscure.

In the treatment of this disease, attention should be paid to the diet. All stimulating condiments and drinks should be forbidden, and only a plain, easily digested food allowed. Internal remedies are seldom of use excepting opium, which in severe cases is required in free or large doses, in order to procure rest. The local applications that have been recommended are very numerous. Lotions of spirit, diluted vinegar, solution of acetate of ammonia, glycerine, prussic acid, &c., and ointments containing creasote, iodide of sulphur, aconitine, &c., have been advocated by various physicians of eminence. Unless, however, the greatest attention is paid to personal cleanliness, no remedy is likely to be of permanent benefit.

PRUSSIA (Germ. *Preussen*) is a kingdom of Northern Germany, consisting of two large tracts of land, separated from one another by other states. The eastern or larger portion is bounded N. by the Baltic; E. by Russia and Poland; S. by Austria and Austrian Poland, Saxony, Reuss, and Schwarzburg; and W. by Electoral Hesse, Hanover, Brunswick, and the Mecklenburg duchies. The western or smaller half is bounded N. by the Netherlands and Hanover; E. by Schaumburg-Lippe, Lippe-Detmold, Brunswick, Hanover, the Hesse territories, Waldeck, Nassau, Oldenburg, and the Rhenish Palatinate; S. by France; and W. by Belgium, and the Netherlands. Besides these two large sections of territory, P. owns various detached domains lying within the boundaries of other states, the largest of which are the Principality of Hohenzollern (q. v.) and Jade, in Minden.

The following table gives (according to the *Almanach de Gotha* for 1865) the areas and populations of the 8 provinces into which P. is divided:

	Area in sq. miles.	Pop. at the close of 1861.
1. Prussia,	24,739	2,866,866
2. Posen,	11,260	1,485,550
3. Pomerania,	12,111	1,389,739
4. Silesia,	15,577	3,390,695
5. Brandenburg,	15,417	2,407,759
6. Saxony,	9,673	1,976,417
7. Westphalia,	7,737	1,618,065
8. Rhenish Prussia,	10,230	2,215,784
District of Hohenzollern,	444	64,675
" Jade,	5	950

The troops quartered beyond the Prussian boundary number 14,720; giving for the whole of P. a population of 18,491,220, with an area of 107,183 square miles.

Physical Character, &c.—The eastern and larger portion of P. is a part of the great table-land of Eastern Europe, and, except in the south, on the Bohemian boundary, is an almost unbroken plain, only 600 or 700 feet above the level of the sea. The Sudetic Mountains, whose northern ranges, known as the Riesengebirge (q. v.), lie between the Oder and the Elbe, divide P. from Bohemia; while the Thüringerwald and the Harz Mountains (q. v.) intersect the line dividing it from Saxony, Hanover, and some of the lesser German states. None of these ranges rise, even in their highest summits, above 5000 feet. The surface of the great plain of Eastern P. is marked by two distinct tracts of more elevated land, one of which belongs to the elevation which, running generally parallel to the Baltic, may be traced from the mouth of the Elbe to the source of the Volga, and which in P. rises about 400 feet above the sea-level. This tract is diversified with numerous lakes, none of which is more than 20 square miles in extent, but which altogether occupy an area of more than 300 square miles. The

soil, consisting chiefly of loose sand interspersed with a large number of erratic blocks of granite, is sterile, covered in many places with heaths and belts of stunted pines. On the northern slope, terminating on the shores of the Baltic, there are several fertile districts, more especially along those rivers which have been carefully embanked, as the Niemen and the Vistula. The southern elevation of the Prussian plain, running between the Polish mountains of Sandomir in the south-east, and the Elbe between Magdeburg and Burg in the north-west, attains a height of about 1000 feet near Breslau on the Oder, where it is known as the Trebnitz Heights. Its general character is more fertile than the northern elevation; while the country between the two is, for the most part, extremely sterile. It includes the sandy waste in which Berlin, the capital, is situated. South of this tract, and in Silesia and Prussian Saxony, the country is fertile, including some of the most productive grain-growing districts of Prussia. Eastern P. has four large rivers—the Elbe, Oder, Vistula, and Niemen; the numerous affluents of which, running east and west, together with many smaller streams, between the two elevated tracts of the plain, contribute largely to the facilities of intercourse throughout the country, as many of them are navigable for vessels of several hundred tons.

Western P., which includes the Rhenish districts and Westphalia, is divided by the Rhine into two portions, each of which has an elevated and a low plain. On the west bank of the river, the level land terminates in the northern extremity of the Vosges, or, as they are here called, the Hardt Mountains, and extends northward as far as Aix-la-Chapelle. This table-land is broken along the banks of the Moselle by ranges of the Hochwald and the Soonwald, the highest summit of which, Walderbsenkopf, attains an elevation of about 2700 feet. The plain north of the Moselle, which is known as the Eifel and the Hohe Veen, has a mean elevation of 1600 feet, with a few higher hills. The level country between the Rhine and Maas, bordering the Eifel, is extremely fertile. On the east side of the Rhine, the table-land, rising along the banks of that river and the Main, terminates in the ridge of the Taunus, whose highest summit, the Feldberg, attains a height of more than 2800 feet, or about 800 feet more than the mean elevation. In the north, the plain ends in the Westerwald between the Lahn and the Sieg, and in the Sauerland between the Sieg and the Ruhr. The soil is generally poor in these districts, which, however, possess special sources of wealth in their iron and coal mines.

The narrow valley of the Rhine is noted as one of the most picturesque and beautiful parts of Germany. The Rhine (q. v.) is navigable throughout its entire course in P., which it traverses from south to north, receiving numerous other rivers—as the Lahn, Wied, Sieg, Wupper, Ruhr, Lippe, Berkel, and Vechte on the right; and on the left, the Ahr and the Moselle, the latter of which is navigable for more than 150 miles within the Prussian dominions. The rivers of P. are connected by numerous canals, the principal of which are the Neuer or Seckenburger, the Friedrichsgraben, the Finow, Bromberger, and Friedrich Wilhelms, which unite the important districts of the Oder with the Vistula; the Spre and the Havel; and the Planesche, which connects the latter river with the Elbe.

Climate, Products, &c.—The climate of P. presents great differences in the eastern and western provinces—the former being exposed to heavy snow-storms in the winter, and great drought in the summer, and with a mean annual temperature of 15°

concerns; the Protestant churches acting in conjunction with a consistory, one of which exists in each province, under the direction of the upper president, or provincial governor, and a clerical superintendent-general, who in Posen and Pomerania bears the title of bishop; while the Roman Catholic Church is directed by the two archbishops of Posen and Gnesen, and Cologne, under whom stand the four bishoprics of Culm, Münster, Paderborn, and Treves. The two episcopal sees of Breslau and Ermeland are directly under the jurisdiction of the pope, while the district of Glatz, in Silesia, belongs to the archbishopric of Prague, and Katscher, in Upper Silesia, to that of Olmutz. At a rough estimate, there are about 11½ million Protestants to nearly 7 million Roman Catholics, and upwards of 250,000 Jews, the rest of the population belonging to the Greek Church, and other religious denominations. The Protestants have rather more than 9000 licensed places of worship, with 6500 ordained clergymen; and the Roman Catholic Church nearly 8000 churches and chapels, with upwards of 6000 priests. There are 183 monastic or conventual establishments, with nearly 4000 inmates, the greater number of which are more especially devoted to purposes of education, or nursing the sick.

Education.—Education is compulsory in P., and its management and direction under the control of the state. In no country are better or ampler means supplied for the diffusion of knowledge among all classes of the community. P. has seven universities—viz., Königsberg, Berlin, Greifswald, Breslau, Halle, Münster, Bonn, and two colleges for the Catholic priesthood at Brauneberg and Münster; which together number 5600 students. At the close of 1861, there were in P. 28,546 schools and educational establishments of every kind, exclusive of the universities; and of these 300 were higher schools (gymnasiums), about 1000 classical private schools, 58 normal, and about 700 art, trade, and handicraft schools, and about 25,000 public elementary schools, with 35,000 teachers, and about 2,700,000 scholars. The management of the elementary national schools is in the hands of the local communities; but the state appoints the teachers, and in part pays their salaries, the remainder being supplied by the public. In addition to the libraries of the several universities, there is the Royal Library at Berlin, with 500,000 volumes and about 10,000 MSS. Among the numerous scientific, artistic, and literary schools and societies of P., the following are some of the more distinguished: the Academy of Arts, founded in 1699; the Royal Museum of Arts; the Academy of Sciences; the Natural History, Geographical, and Polytechnic Societies of Berlin; the Antiquarian Society of Stettin; the Breslau Natural History and Historical Societies; &c.

Charities.—P. has a large number of benevolent institutions, towards the maintenance of which the state gives annually about £16,000 sterling. In 1861 there were about 1000 public civil and military infirmaries, in which upwards of 170,000 patients were under treatment, and between 7000 and 8000 poor and almshouses; while 800,000 poor received support through these institutions or by extraneous relief. P. is supplied with asylums for the deaf and dumb, the blind and the maimed, and has good schools for training midwives, nurses, &c.

Justice.—The highest court of law is the Upper Tribunal in Berlin, and each province has its special court of appeal. Besides these, there are 125 magisterial, 7 commercial, and numerous military courts. In the Cologne district, the *Code Napoléon* is in force, and in Hither-Pomerania, the common

German law; but in other parts of the kingdom the Prussian code, compiled under Frederick the Great's direction, and introduced in 1794, is followed. A new penal code was promulgated in 1850, by which all pre-existing, seigniorial, municipal, or ecclesiastical rights of decreeing punishments were unconditionally abrogated. Members of the royal family are amenable to special laws and courts. Lesser courts for the settlement of minor debts and disputes, and juries have been introduced in every province of late years, and publicity is demanded by the constitution in the conduct of criminal cases. There are 44 civil prisons. The administration of military matters is under the control of the minister of war; military courts are presided over by two civil and three military officers, and are subordinate to the local provincial courts of appeal.

Army, Navy, &c.—The army numbers on a peace footing 191,033, and in time of war 356,532; besides 8265 garrison troops in the former case, and in the latter 153,966 garrison troops, and 123,923 men at the dépôts. The cavalry contributes 37,561 of this number in war time. The army consists of the regular troops and the landwehr, and in time of war an extra contingent can be called up under the title of the landsturm. Every able-bodied male Prussian is liable to be called upon to serve between 20 and 39 years of age. Mennonites (see ANABAPTISTS), clergymen of the Roman Catholic and Evangelical churches, and indispensable supporters of families are exempt. The time of active service is three years for some branches of the service, and two for the others. P. has 30 fortresses, of which Dantz on the Weser, Magdeburg, Cologne with the fortifications of Deuts on the opposite right bank of the Rhine, and Coblenz with the opposite rocky heights of Ehrenbreitstein, rank in the first class as the strongest. Great care is bestowed on the education and military training of officers and men, and besides numerous admirable academies, there are several good schools of operative and veterinary surgery, &c., connected with the educational department of the army. The Prussian navy, in 1864, numbered 119 vessels of all descriptions, carrying 416 guns and 3504 men. There is a harbour for the coast-flotilla on the island of Danholm, near Stralsund, where there is a navigation school and a naval academy. The territory on either side of the mouth of the Jahde was purchased in 1853 from Oldenburg, with a view of obtaining a port on the German Ocean.

Constitution, &c.—P. was an absolute monarchy till the crisis of 1848, when the decided movement in favour of liberal views compelled the late king to convoke a national assembly and submit to the establishment of a constitutional form of government. The national representative body now consists of an upper chamber or *Herrnhaus*, with 20 members, which is composed of the princes of the royal house, elected by the king, and of members of 14 mediatised princely houses, the great noble landowners, high official dignitaries, 5 representatives of the universities, and 27 representatives of cities. The lower chamber has 352 members, chosen by electors, whose numbers bear the relation of 1 to every 20 of the population. In addition to this general house of assembly there are representative bodies for the provinces, communes, and circles, which debate and legislate in regard to local matters within their several departments. The council of state is composed of 10 ministers, under whom ministries are numerous departments, embracing almost every conceivable subdivision of foreign policy or internal legislation, since nothing can be done in P. independently of the state. By the modified constitution of 1850, all executive

elected as their grand-master the Markgraf Albert of Anspach and Baireuth, a kinsman of the king of Poland, and a scion of the Frankish line of the Hohenzollern family. Although his election did not immediately result, as the knights had hoped, in securing them allies powerful enough to aid them in emancipating themselves from Polish domination, it was fraught with important consequences to Germany at large, no less than to the order itself. In 1525, the grand-master was acknowledged Duke of P., which was converted into a secular duchy (afterwards known as East P.), and renounced the Roman Catholic religion for Lutheranism, his example being followed by many of the knights. The country made rapid advances under the rule of Albert, who improved the mode of administering the law, restored some order to the finances of the state, established schools, founded the university of Königsberg (1544), and caused the Bible to be translated into Polish, and several books of instruction to be printed in German, Polish, and Lithuanian. His son and successor, Albert Frederick, having become insane, a regency was appointed. Several of his kinsmen in turn enjoyed the dignity of regent, and finally his son-in-law, Johann Sigismund, elector of Brandenburg, after having held the administration of affairs in his hands for some years, was, on the death of the duke in 1618, recognised as his successor, both by the people and by the king of Poland, from whom he received the investiture of the duchy of P.; which, since that period, has been governed by the Hohenzollern-Brandenburg House.

Here it will be necessary to retrace our steps in order briefly to consider the political and dynastic relations of the other parts of the Prussian state. In the 12th c. the northern Mark, comprising probably the territory between the Elbe and the Oder, as far as its confluence with the Spree, was held by the immediate descendants of Albert the Bear of Luxemburg, its first hereditary markgraf, who, during the next two or three centuries, extended their dominions eastward, beyond the Oder into Further Pomerania. On the extinction of this line, known as the Ascanian house, a remote kinsman, Frederick VI., count of Hohenzollern, and markgraf of Nürnberg, became possessed, partly by purchase and partly by investiture from the emperor, of the Brandenburg lands, which, in his favour, were constituted into an electorate. This prince, known as the Elector Frederick I., received his investiture in 1417. He united under his rule, in addition to his hereditary Franconian lands of Anspach and Baireuth, a territory of more than 11,000 square miles. His reign was disturbed by the insubordination of the nobles, and the constant incursions of his Prussian and Polish neighbours, but by his firmness and resolution he restored order at home and enlarged his boundaries. We are told that he gained possession of the castles of his refractory nobles by the aid of a 24-pounder, known as the *Faule Grete*; but even this unwonted auxiliary was of no avail in a long war which he waged against the Hussites, who devastated the land, and razed many of his cities in revenge for the part which Frederick had taken in acting as commander-in-chief of the imperial army, which had been sent against them. Under Frederick's successors the Brandenburg territory was augmented by the addition of many new acquisitions, although the system of granting appanages to the younger members of the reigning house, common at that time, deprived the electorate of some of its original domains, as for instance the markgratate of Anspach, which passed, on the death of the Elector Albert Achilles in 1486, as an independent state to his

younger sons and their descendants. The most considerable addition to the electorate was the one to which reference has already been made, and which fell to the Elector John Sigismund through his marriage in 1609 with Anne, daughter and heiress of Albert Frederick, the Insane, duke of Prussia. In consequence of this alliance, the duchy of Cleves, the countships of Ravensberg, the Mark, and Limburg, and the extensive duchy of P., now known as East P., became incorporated with the Brandenburg territories, which were thus more than doubled in area. The reign of John Sigismund's successor, Georg-Wilhelm (1619—1640), was distracted by the miseries of the Thirty Years' War, and the country was alternately the prey of Swedish and imperial armies; and on the accession of Georg-Wilhelm's son, the great Elector Frederick-William (q. v.), in 1640, the electorate was sunk in the lowest depths of social misery and financial embarrassment. But so wise, prudent, and vigorous was the government of this prince, that at his death in 1688 he left a well-filled exchequer, and a fairly-equipped army of 38,000 men; while the electorate, which now possessed a population of one and a half million, and an area of 42,000 square miles, had been raised by his genius to the rank of a great European power. His successors, Frederick III. (q. v.), (1688—1713) and Frederick-William I. (1713—1740), each in his own way increased the power and credit of P., which had been in 1701 raised to the rank of a kingdom. The latter monarch was distinguished for his rigid economy of the public money and an extraordinary penchant for tall soldiers, and left to his son, the great Frederick II. (q. v.), a compact and prosperous state, a well-disciplined army, and a sum of nearly nine million thalers in his treasury. Frederick II. (1740—1786), dexterously availed himself of the extraordinary advantages of his position to raise P. to the rank of one of the great political powers of Europe. In the intervals between his great wars, he devoted all his energies to the improvement of the state, by encouraging agriculture, trade, and commerce, and reorganising the military, financial, and judicial departments of the state. By his liberal views in regard to religion, science, and government, he inaugurated a system, whose results reacted on the whole of Europe; and in Germany, more especially, he gave a new stimulus to thought, and roused the dormant patriotism of the people. Frederick was not over-scrupulous in his means of enlarging his dominions, as he proved by sharing in the first partition of Poland in 1772, when he obtained as his portion, nearly all West-P., and several other districts in East Prussia. His nephew and successor, Frederick-William II. (1786—1797), aggrandised his kingdom by the second and third partitions of Poland in 1793 and 1795. Frederick-William III. (q. v.), (1797—1840), who had been educated under the direction of his grand-uncle, Frederick the Great, succeeded his father in 1797, at a time of extreme difficulty, when continental rulers had no choice beyond being the opponents, the tools, or the victims of French republican ambition. By endeavouring to maintain a neutral attitude, P. lost her political importance, and gained no real friends, but many covert enemies. But the calamities which this line of policy brought upon P. roused Frederick-William from his apathy, and with an energy, perseverance, and self-denial, worthy of all praise, he devoted himself, with his minister Count Hardenberg, to the reorganisation of the state. In the ten years which succeeded the battle of Waterloo, P. underwent a complete reorganisation. Trade received a new impulse through the various commercial

treaties made with the maritime nations of the world, the formation of excellent roads, the establishment of steam and sailing packets on the great rivers, and at a later period the organisation of the customs-treaty, known as the Zollverein (q. v.), between P. and the other states of Northern Germany, and through the formation of an extended network of railways. The most ample and liberal provision was made for the diffusion of education over every part of the kingdom, and to every class. In like manner, the established Protestant Church was enriched by the newly-inaugurated system of government supervision, churches were built, the emoluments of the clergy were raised, and their dwellings improved; but not content with that, the king wished to legislate for the church in accordance with a set plan; and when the various Protestant churches refused to be joined in the Utopian union prescribed for them, difficulties arose. This tendency to over-legislation has long been the predominating evil feature of Prussian administration, and the state, without regard to the incongruous elements of which it was composed, was divided and subdivided into governmental departments, which, in their turn, under some head or other, brought every individual act under governmental supervision, to the utter annihilation of political or mental independence. The people, when they gradually began to comprehend the nature of this administrative machinery, saw that it made no provision for political and civil liberty, and demanded of the king the fulfilment of the promise he had given in 1815 of establishing a representative constitution for the whole kingdom. This demand was met with the most hypocritical and despotic insincerity on the part of the king, who professed to take high religious views of his duty as a sovereign, and its immediate fruits were strenuous efforts on his part to check the spirit of liberalism. Every measure taken by other sovereigns to put down political movements was vigorously abetted by him. Siding with the pietists of Germany, he introduced a sort of Jesuitical despotism, which has been continued by his sons, the late and the present king. The *Landstände* or provincial estates, organised in accordance with the system of the middle ages, were the sole and inadequate mode of representation granted to P. in this reign, notwithstanding the pledge made to the nation for a full and general representative government. An attempt made forcibly to unite Lutheran and Reformed Churches excited universal indignation, while the imprisonment, at a later period, of the Archbishops of Cologne and Gnesen for their conduct in regard to the vexed question of mixed marriages, involved the king in a long and fruitless dispute with the pope. The accession of Frederick-William IV. in 1840 seemed to open a better prospect to the friends of constitutional freedom, but the reality was scarcely equal to the expectations which had been warranted by the professions of the government. Still new hopes and requirements had been excited, and a new life was infused into every department of the state. Every branch of science, art, and literature was understood to receive the attentive consideration of the sovereign, who professed to be actuated by a love of universal progress. He made similar professions in regard to religious toleration, but the pietistic tendencies of his government exerted a forced and prejudicial influence in every department of the state; while the bureaucratic spirit of over-governing which characterised the administration was becoming daily more and more irksome to the nation, and gave rise to the formation of free churches or Protestant communities; while a contemporaneous excitement which had

arisen in the Roman Catholic Church of P., as the result of the schismatic movement due to the stand taken by the chaplain Ronge (q. v.) on the exhibition of the so-called Holy Coat of Treves (q. v.), further complicated the relations between church and state. The king and his advisers, underrating the importance of the movement of 1848 in Germany, thought they had satisfied the requirements of the hour by granting a few unimportant reforms, and making equivocal promises of further concessions. When at length, however, the citizens and troops came into collision, and blood was shed, Frederick-William came forward as the professed regenerator of his country, offering to lay down his royal title and merge his kingdom in the common fatherland, for the salvation of which he recommended a cordial union of all German princes and people in one bond, and proposing himself as the guide and leader of this new Germany. His own subjects, and at first many Germans in other states, were carried away by these Utopian schemes. The publication of a political amnesty, the nomination of a liberal ministry, the recognition of a civic guard, the retirement of the Prince of Prussia, the heir-presumptive—with whom every arbitrary measure of government was believed to originate—and the summons of a representative chamber to discuss the proposed constitution—all tended to allay the general discontent. But when the national assembly at Frankfurt, in disregard of the wishes of the Prussian king, declined to accept his proffered services, and elected the Archduke John of Austria lieutenant-general of Germany, his ardour in the cause of the fatherland cooled, his pledges to his own subjects were evaded as long and as completely as the occasion permitted, and his policy became more strongly tinged than before with a jealousy of Austria. His powerful co-operation in putting down the insurrection in Poland, and the democratic party in Baden, gave, however, ample proof of his determined opposition to every popular demonstration against absolutism. In the war of the Slesvig-Holstein duchies, the Prussians acted in concert with the disaffected against their sovereign, the king of Denmark, occupying the ducal provinces in the name and on the behalf of the diet. The latter years of this reign were characterised by great advance in the material prosperity and internal improvement of the country. Extensive lines of railway and post-roads were opened, the river navigation greatly facilitated, treaties of commerce formed with foreign countries, and great expansion given to the Prussian and North German Zollverein (q. v.), the army put upon a footing of hitherto unprecedented efficiency of arms and artillery, and the educational system of the country still further developed. The political freedom of P. cannot, however, be said to have made equal advance. The chambers which met for the discussion and framing of a constitutional mode of government, were constantly interrupted and obstructed in the prosecution of their task, and the constitution, which is now established by law, was modified every year between 1850 and 1857, until it may be said to retain few of its original bases; while the practical despotism of Frederick-William IV., and of his brother, the present king, who succeeded him in 1861, has hitherto put an effective check on all measures proposed by the body of representatives, which might have a tendency to interfere with the absoluteness of the regal power, or to promote the advance of thought and the progress of political freedom in the Prussian dominions. It was believed generally throughout Europe that the Liberals of Prussia, whose representatives formed a large majority in the Chamber of Deputies, were resolutely

bent on resisting the encroachments of the sovereign on their liberties; but partly through the unconstitutional audacity of the Prussian prime-minister, Count von Bismark, and partly through the outburst of national enthusiasm in the Schleswig-Holstein war, their 'opposition' has as yet produced no effect, nor even originated a policy.

PRUSSIA, one of the tight provinces into which the kingdom of the same name is divided, is bounded on the S.W. by Pomerania and the Baltic Sea, and on the E. and S. by Russia and Poland. Area, 24,739 sq. m.; pop. (1862) 2,866,866. It is divided into two districts or sub-provinces—East Prussia (14,833 sq. m.) and West Prussia (9906 sq. m.). About two-thirds of the soil consists of good land, the remainder being chiefly sandy. Agriculture is by far the most important branch of industry, manufactures being confined to such articles as supply merely local wants. Wheat is extensively cultivated, especially in the district of Gumbinnen; and, as the inhabitants live chiefly upon rye, the larger half of the wheat grown is exported. P. possesses a larger number of horses than any other province in the kingdom. For the history of the province of P., and for its principal physical features, see **PRUSSIA, KINGDOM OF**.

PRUSSIAN BLUE. See **BLUE, CYANOGEN**, **FERROCYANOGEN**, and **FERRIDCYANOGEN**.

PRUSSIC ACID. See **HYDROCYANIC ACID**.

PRUTH, an important affluent of the Danube, rises in the south-east of the Austrian crown-land of Galicia, on the north-east side of the Carpathian mountains, and near the base of Mount Rusky in that range. It flows in a deep valley eastward past Kolomes and Czernowitz, and, forming the boundary between Moldavia and the Russian territories from Bojana, passes Liptchany, then flows south-south-east to Katamori; after which its course lies south through Moldavia to the Danube, which it enters at Reni, about 12 miles below Galatz. Total length about 500 miles. Its affluents are very numerous but are inconsiderable.

PRYNNE, WILLIAM, noted as a pamphleteer and active politician during the reign of Charles I., and the subsequent period of the Commonwealth, was born near Bath in the year 1600. He received his early education there, and was afterwards transferred to Oriel College, Oxford, where, in 1620, he took his bachelor's degree. Selecting the law as his profession, he entered himself at Lincoln's Inn, where he became a bencher and reader; but it does not appear that he ever very seriously endeavoured to obtain practice at the bar. He was early drawn into the vortex of ecclesiastical controversy, and speedily made himself heard of as a champion of the Puritan party. In 1632, appeared his *Histriomastrix, or a Scourge for Stage Players*, a tasteless and scurrilous attack on the popular amusements of the period, which procured him the attention of the authorities. For this performance he underwent prosecution in the Star Chamber, with results sufficiently unpleasant. His sentence involved him in a fine of £3000, degradation from the bar, expulsion from Oxford and Lincoln's Inn, the loss of both his ears in the pillory, and the shock to his vanity as an author, of seeing his book burned in public by the hangman. He was, moreover, condemned to perpetual imprisonment, and immured in the Tower accordingly. If the severity of the punishment seems, at first sight, astounding in its disproportion to the nature and amount of the offence, it is perhaps sufficiently explained by the fact, that P., by his previous issue of a series of anti-prelatical tracts, as by other indications of hostility, had made himself most obnoxious to Archbishop Laud and the clergy.

Three years after, the pertinacious offender found means to publish from his prison another pamphlet, in which he fiercely attacked the hierarchy, and was unsparing in his personal abuse of Laud and certain other bishops. For this he was again prosecuted; a fine of £5000 was imposed upon him; he was once more pilloried, losing such stumps of ears as the executioner had before spared; and was branded on both cheeks with the letters S. L. (Seditious Libeller). He was then removed to Caernarvon Castle, and afterwards to that of Mont Orgueil, Jersey, where he remained a close prisoner, till, in 1641—the Long Parliament then sitting—he was released by a warrant of the House of Commons, and a tumultuous expression of popular sympathy celebrated his restoration to liberty. Shortly afterwards, he was sent to parliament as member for Newport, in Cornwall, and for some years was actively, and, at times, even prominently engaged on the popular side in the proceedings of the House of Commons. In the extreme measures, however, leading to the deposition and death of the king, he declined all share; and being one of those of whom Cromwell shortly after 'purged' the House of Commons, he proceeded to assail him in print with an asperity not inferior to that with which he had before made war upon the bishops, as a consequence of which imprudence he was once more subjected to several years' imprisonment. On Cromwell's death he returned to his place in parliament, zealously interesting himself in the royal cause; and after the Restoration, the office was bestowed on him of Keeper of the Records in the Tower. Subsequently, his inveterate habit of venomous pamphleteering involved him in difficulties with the House of Commons, from which, on a charge of seditious libel, he narrowly escaped expulsion. He died at Lincoln's Inn in October 1669. The continuous stream of writings on the perilous topics of the day, which brought him so constantly into trouble, represents but a fraction of P.'s literary activity. He busied himself chiefly as a compiler of matter illustrative of constitutional and parliamentary history. His most valuable works in this field are the *Calendar of Parliamentary Writs*, and his *Records*, both of which contain much that is useful and important.

PSALMANAZAR, GEORGE, a somewhat remarkable impostor, was born about the year 1680. His real name and the place of his birth are unknown, but he is presumed to have been a native of Switzerland or the South of France. He received a good education, and gave early indication of talent, more especially for the acquisition of languages. Impelled by a restless and impatient temper, which indisposed him to any regular pursuit, for some years he roamed over Europe as a mere vagabond adventurer, assuming at first the disguise of an Irish pilgrim, exiled on account of his religion; and afterwards as soldier, menial, preceptor, beggar, or vagrant nondescript, living on his wits as he could, according to the whim or necessity of the hour. In the course of his wanderings, he was thrown into contact with a Colonel Lauder, commanding a Scotch regiment at Sluys, on whom he first passed the imposture to which he subsequently owed his notoriety, assuming the name by which he is since known, and representing himself as a Japanese convert to Christianity and native of the island Formosa. The good colonel seems to have been completely deceived by him; not so, however, the chaplain of the regiment, one Innes, a man equally acute and unprincipled, who speedily detected the deception, but was not the less willing to use it for the furtherance of his own ends. By Innes, P. was brought to England, and instantly became the

the incumbent, have to a large extent taken the place of metrical psalms in the Church of England.

In Scotland, the early Reformers, while they banished instrumental music from churches, paid great attention to singing. In John Knox's Psalter, arranged for use in churches, the metrical psalms are set to music in harmony of four parts. Several early translations of the Psalms were produced in North Britain, but that of Sternhold and Hopkins was used in worship from 1564 down to the middle of the 17th century. In 1632, an attempt made by Charles I. to supersede it by King James's version, was more resolutely and decidedly opposed than in England. The version now in use in Scotland was introduced during the Commonwealth by the General Assembly, and founded on the metrical translation of Francis Rous, a member of Cromwell's council, which parliament had in vain endeavoured to bring into general use in England. This new version was in 1649 appointed by the General Assembly to be the only paraphrase of the Psalms sung in the Kirk of Scotland, and all other versions were prohibited to be made use of not merely in congregations, but in families, after 1650. Though somewhat rough and uncouth, it is sometimes expressive and forcible, and perhaps nearer the original than any other metrical translation of the Psalms. A few Paraphrases and Hymns have since been added, by authority of the General Assembly, and form together the psalmody in use in Presbyterian worship in Scotland.

PSALMS (Heb. *Tehillim*, Songs of Praise, or *Tefilloth*, Prayers; Jerome, *Liber Hymnorum*), the well-known canonical book generally ascribed to David. The single hymns contained in the book are variously designated either as 'Prayer' (*Tefilla*), as 'Praise' (*Tehillah*), or from some special characteristic 'Song' (*Shir*), or a song of deeper meaning, (*Michtam*), 'Instruction' (*Maskil*), or a dithyrambic poem (*Shigayon*). Respecting the general contents of the book, it may be said that it comprises, in the form of pious lyrics, written for and on behalf of the congregation, the quintessence of the dogmatical, ethical, historical, and theoretical portions of the Old Testament. The divine essence and qualities, providence and its guidance—especially of Israel—the rule of the universe, the nature of the human heart and its relations to God and His revelation, the blessings of the theocratic community: these and similar reflections form the themes of its ever-varying modes. A certain more spiritual conception of the ordinances of the Pentateuch is visible throughout, and although the strictest adherence to these is enjoined, yet their deeper meaning is impressed more strongly still. Used as a liturgical hymn book in the Temple, it has been bodily received for the same purpose in the Christian church; and certain additional hymns which occur in the Greek and Syriac Psalter have not been sanctioned by the authority of the general church. There are, in all, 150 canonical hymns or psalms, which, after the model of the Pentateuch, have been divided into five books—thus: i.—xli.; xlii.—lxxii.; lxxiii.—lxxxix.; xc.—cvi.; and cvii.—cl. The Syriac, the LXX., and the Vulgate Versions differ in some respects in their counting. The Authorised Version, however, follows strictly the Masoretic Jewish text, except with regard to the numbering of the verses; for while the latter includes the superscriptions among the verses, the former does not reckon those. This division into five books is, as it is traditional, also the most natural; and the doxologies at the ends of psalms xli., lxxii., lxxxix., and cvi., further mark authoritatively the respective ends of the special divisions. A further division, or rather classification, has been

attempted according to the contents; but, considering the constantly changing variety of moods and sentiments of manner and contents which these songs exhibit, it is a most precarious one.

The Psalms have generally—thirty-four only excepted—superscriptions more or less expressive of the contents of the special hymn, and sometimes with, sometimes without, the name of an author. In some, certain notes, referring to the musical and liturgical part, are added, which are far from being quite clear now, e.g., 'On the octave,' 'For the chief musician,' 'On Machalath' (illness?), 'In the time of death to the son,' 'The hind of Aurora,' 'Lilies,' 'Dumb dove of the far ones,' &c. One of the greatest puzzles is the word *Selah*, which occurs several times at the end, or in the middle of some psalms, and which the LXX. render *Diapasma*, 'Interlude,' but about the real signification of which, numerous yet very unsatisfactory suggestions have been made at various times. Thus, it has been identified with *amen*, *hallelujah*, *piano*, &c. So much seems certain, that it was a kind of catchword or sign for the performers. These headings belong very probably to the individual poets themselves, and not to the collectors, as has been surmised.

The authorship of the Psalms is ascribed by the headings of the various chapters as follows: Psalm xc.—one of the most ancient in form and contents—is attributed to 'Moses, the man of God.' Seventy-three psalms are inscribed with David's name; two with Solomon's; twelve with that of Asaph, the Levite and singer, of which five, however, belong to the times of Jehoshaphat, Hezekiah, and the beginning of the Babylonian exile respectively. Eleven psalms go under the name of the Sons of Korah, or the Korahites—a family of singers descended from the Levite Korah, known from the Pentateuch. Their head at the time of David was Heman. Part of these psalms belongs to the time of David; others, to that of Solomon, and others are of an uncertain later period. Respecting the psalm inscribed 'Prayer of Moses,' there seems, indeed, to be no valid reason against its authenticity; it is quite worthy of the great legislator, and to a certain extent similar to other compositions of which he is reasonably regarded as the author. The numerous body of psalms attributed to David, manifest (those at least which can fairly be believed to be his work) a vivid and profound feeling and rare poetical gifts. The singer abandons himself entirely to whatever feeling of joy or grief, repentance or revenge, piety or despair, sweeps over his soul. This also accounts to a certain extent for the violent manner in which he calls down at times the vengeance of God upon the heads of his adversaries; while at others, he humbles himself to the dust on account of his own iniquities. On his style and manner, we cannot enlarge here; suffice it to add, that his lyrics have deservedly been counted among the gems of all human literature for well-nigh 3000 years—quite apart from their sacred liturgical character. Asaph's psalms shew their author to have been a didactic poet of high order; but, as we said before, many of those ascribed to him belong to poets later than the schism, and even posterior to the Exile. The Korahite hymns, although all more or less fraught with the same depth of feeling, the same conciseness, the same grandeur and lyrical exaltation, exhibit signs of being written partly during the time of Solomon, or even during the Exile. Of the anonymous psalms, some may fairly be added to the number of those that issued from the hand of the royal singer himself; others, however, belong to the post-exilian times. Some of these (the *hallelujahs*, for instance, or the 'Songs of

Degrees') were, in all probability, pilgrim-songs, chanted during the ascent to the sanctuary. Whether other psalms belong to the Maccabean period or not—a question hotly disputed—we cannot discuss here.

There is a great deal in favour of the opinion that the collection and redaction of the book, such as we have it now, is owing to one man, who arranged the single hymns according to their contents and tendency. Thus, following all the while the law of analogy, the redactor gave the first place to David's and his contemporaries' (Asaph, Ethan, Heman) compositions. These were further classified according to the prevalent use of the peculiar divine name (Jehovistic and Elohist), and were divided into three books—the first of which contains the Davidic Jehovistic psalms; the second, the Elohist ones of the Korahites, of Asaph, David, Solomon, and some unknown poets; the third, the rest of Asaph's and the Korahite psalms of a mixed (Jehovah-Elohist, or purely Jehovistic) nature. The arrangement within these larger classes was made, again, according to the inner nature and relation of these hymns to each other, and by a certain likeness in phraseology, similes, &c. Psalms i. and ii. were then prefixed, on account of their generally introductory matter and manner. The same laws have also been followed in the remaining portions of the collection.

It is difficult to fix the period of the redaction. Assuming, however, the collecting and editing to be the work of one man, he could not possibly have lived before the time of Nehemiah, even according to those who affirm the non-existence of Maccabean psalms in our canon. If, on the other hand, various single collections are assumed, out of which our present book has grown, there is no reason why some of those should not be placed at a much earlier date. We forbear to add a list of writers on the subject of psalms. Nearly all the principal authorities in biblical literature, in the Jewish, Roman, and Protestant churches, have contributed their share towards the elucidation of the Psalms; and to the individual works of the chief biblical commentators, the reader is referred for special information. Le Long, in his *Bibliotheca Sacra*, enumerates more than 500 commentators on the Psalms, and Calmet carries the number up to a thousand. Of these, some are very voluminous, that of Le Blanc filling no fewer than six folio volumes.

PSAMMETICHUS, the name of three kings of Egypt, of the 26th dynasty, distinguished on the monuments by different prenomena, and of two other persons of ancient history. The first and most notable P. was the son of Necho I. After the defeat and death of his father, he fled into Syria, and thence, by means of foreign aid, appears to have established himself as one of the twelve monarchs who then reigned over Egypt, with the rest of whom he was connected in a kind of federation. An oracle having declared that the monarchy of the whole country should go to that one who made a libation out of brass, P. fulfilled the condition by pouring it out of a brazen helmet. By the answer of another oracle, he was told that he should succeed by means of brazen men who would appear from the sea. Some Carian and Ionian pirates who appeared soon after in panoplies of brass on the shores of Egypt, answered the response of the oracle. P. engaged them in his service, and by their means finally subdued his rivals at Momemphis, after a struggle of fifteen years' duration. He strengthened his power by employing Greek mercenaries, whom he settled at Daphnon and Pelusium, to protect the eastern

borders of Egypt, and whose headquarters were subsequently transferred to Memphis. To them he assigned the right wing, or post of honour, in the army—their arms and discipline being far superior to that of the native troops. This proceeding gave great disgust to the Egyptian army, and on his refusing to send the Greeks home, after their term of service, the Elephantine garrison, of 240,000 men, deserted the country, and marched into Ethiopia beyond Meroë. Although exhorted, they refused to return. To protect Egypt from the Syrians, he besieged Azotus, which he finally took, after 29 years' siege. P. fostered in every way the Greek influence in Egypt, divided amongst them lands, encouraged the study of the language, and contracted alliances with the Athenians. He also facilitated the commerce, and opened the ports which had been hitherto closed. Under P., the arts revived, the sculpture and architecture imitated the older prototypes, and the government was remodelled on the plan of the ancient dynasties. In literature, a new handwriting, the demotic, was introduced. Egypt, however, had fallen into a national decadence, and its old polity and institutions, subverted by the foreign influence prevalent in the country, could not be restored. P. reigned, according to Manetho, 54 years; his reign closed about 609—610 a.c. The other personages of this name are of little importance.—Herodotus, ii. 154; Pliny, *Nat. Hist.* vi. 35; Diodorus, i. 67; Champollion-Figeac, *L'Egypte*, pp. 367—370; Sharpe, *Hist. Egypt*, p. 58.

PSIDIUM. See GUAVA.

PSITTA'CIDÆ. See PARROT.

PSKOV (Ger. *Pleskau*), a government in the north-west of European Russia, lies south of the governments of St Petersburg and Novgorod. Area, 17,845 square miles; pop. 723,834, almost all Russians, except in the western districts, where there is a small number of Finns. The climate is temperate, the surface is hilly in the west, and the soil is of average fertility. Lake Pakov and Lake Ilmen receive almost all the drainage of the government, the river Velikaia falling into the former, and the Shelon, the Polista, and the Lovat into the latter. The rivers are navigable for rafts, and, nearer their mouths, for barges and ships. Lakes abound in the eastern and south-eastern districts. Agriculture is the staple employment; flax-growing being the most remunerative branch. The manufactures carried on in the government are inconsiderable. The St Petersburg and Warsaw Railway, by which ready access is afforded to the metropolitan market for the agricultural productions of P., is expected to have a beneficial influence in developing the industry and resources of the government.

PSKOV, a town in the north-west of European Russia, capital of the government of the same name, stands on the banks of the Velikaia, 180 miles south-south-west of St Petersburg by railway. During the 14th and 15th centuries, it made one in the confederation of the Hanse Towns, and had then a population greater than at present. In 1510, it was annexed to the kingdom of Moscow. During the wars with Lithuania, P. was a stronghold of great importance. It contains a cathedral, 41 churches, and 4 monasteries. Fish, obtained from Lake Peipus, and flax, are the principal articles of a foreign commerce which is not extensive. Pop. 15,457.

PSORA'LEA, a genus of plants of the natural order *Leguminosæ*, sub-order *Papilionaceæ*, having the calyx permanent after flowering, and its tube sprinkled with callous points; the legume one-seeded, sometimes ending in a beak. The flowers

are blue, purple, or white. The leaves are of various forms, but in general abruptly pinnate. Some of the species are natives of India; others of other warm countries.—*P. esculenta*, the BREAD-ROOT of North America, and *Prairie Apple* of the Canadian boatmen, is an herbaceous perennial, about a foot high, with a carrot-like root, swollen above the middle, and abounding in farinaceous matter. It is used as an article of food, both boiled and raw. In Britain, it requires the protection of a frame, in order to produce an abundant crop or large roots.

PSORIASIS (from the Greek word *psora*, which signifies a cutaneous eruption, supposed by some to be the itch) is now employed to signify a disease characterised by slight elevations of the surface of the skin covered with whitish scales. There are various forms of this disorder, such as *P. guttata* (which is the simplest kind, and derives its specific name from the scales not coalescing, but remaining distinct, like isolated drops of water on the skin); *P. diffusa*, when the disease spreads over large portions of the skin, and often renders the patient hideous to look at, the scaly incrustations being often interspersed with bleeding cracks and fissures in all directions; *P. inveterata*, which is merely the severest phase of the preceding form, and occurs chiefly in aged persons of broken-down constitution; and *P. gyrate*, a rare form, in which the disease occurs in narrow stripes or rings. The causes of psoriasis are very obscure. It is certainly not contagious, but there appears to be in some families an hereditary tendency to it. It is occasionally associated with gout and rheumatism. Persons of both sexes, of all ages, and of all conditions of life, are liable to it, although it is more common in middle and advanced life than in childhood. The treatment varies with the condition of the patient. A middle-aged, vigorous patient should be purged two or three times a week with sulphate of magnesia, should be restricted in his diet to vegetables and milk, should be debarred from all stimulants, and should take a warm bath daily. The internal remedies of most repute for this disease are—1. Decoction of dalecarina, from half a pint at first to a pint being taken in divided doses through the day; 2. Liquor potasse, in doses of from half a drachm to a drachm, three times a day, in a glass of milk or beer; 3. Liquor arsenicalis, in doses of from three to four minims, three times a day, to be taken after meals; 4. Iodide of potassium, in five-grain doses, three times a day; and 5. Pitch pills. In very inveterate cases, tar ointment, first diluted with lard, or a weak ointment of iodide of sulphur, should be applied locally; but these should not be tried unless internal treatment fails.

PSYCHE (Gr. breath, or soul), a creation of the later mythology of Greece, or perhaps we should rather say, a personification of the human soul, devised by the later poets. Appuleius (q. v.) relates the following story about her, which is obviously allegorical. P. was the youngest of three daughters of a king. She was so exquisitely beautiful that mortals mistook her for Venus, and did not dare to love, but only to worship her. This excited the jealousy of the goddess, who sent Eros (Cupid) to inspire P. with a passion for the most contemptible of all men; but Eros was himself wounded as deeply by her glances as ever he had wounded others with his darts. Meanwhile, P.'s father wished to see his daughter married, and inquired about her at the oracle of Apollo, by whom he was told to bear the maiden in funeral robes to the summit of a hill, and

to leave her there alone, as she was destined to be the bride of a huge all-destroying snake monster, that terrified both gods and men. Amid loud wailing and lament, P. was borne to the fatal spot, and left trembling in horrible solitude, when suddenly a light-winged zephyr flew round her, and bore her off to a beautiful palace of pleasure belonging to Eros, who visited her, unseen and unknown, every night, and left her before morning broke. Here P. would have enjoyed perpetual delight, had she remembered the advice of her unknown lover, who warned her not to seek to know who he was. But her jealous sisters, whom, against Eros's injunction, she had allowed to visit her, working upon her curiosity, persuaded her that she was embracing a monster in the darkness of night; and having lighted a lamp when Eros was asleep, she saw with rapture that she was the mistress of the most handsome of gods. In her excitement, she let a drop of hot oil fall on the sleeper's shoulder, who awoke, upbraided her for her mistrust, and vanished. P. gave way to the most passionate grief; she even thought of drowning herself. After wandering about for some time, she came to the palace of Venus, where she was seized by the goddess, and kept as a slave. Eros, however, who still loved her, invisibly helped and comforted the hapless maiden, reconciled her to his mother, and was finally united to her in immortal wedlock. All critics have agreed to consider the story an allegory of the progress of the human soul through earthly passion and misfortune to pure celestial felicity.

PSYCHOLOGY. See MIND.

PTARMIGAN (*Lagopus*), a genus of *Tetraonidae*, differing from the true Grouse (q. v.) chiefly in having the toes thickly clothed with short feathers as well as the legs (*tarsi*). Hence the name *Lagopus*, a name used by Pliny, from the resemblance of the

Common Ptarmigan (*Lagopus mutus*).

foot to that of a hare. The bill is very short, and clothed at the base with feathers. The species are natives of the northern parts of the world, and either of elevated or of strictly arctic regions. They are not polygamous, like the true grouse, nor do the males strut with erected and expanded tail. Most of the species change colour very much on the approach of winter, assuming a white, or nearly white plumage; and the diversities of colour have caused some confusion and difficulty concerning them. They are all much esteemed for the table. The Common

probably to allow the head to fall back to the centre of gravity during flight. The dorsal vertebrae are from 17 to 20 in number. The sacrum is formed by the coalescence of two vertebrae only, as in existing reptiles, and not of many, as in birds and certain extinct saurians. The tail is generally short, an unusual character with saurians; but a species with a long tail occurs at Solenhofen. There are five toes or digits on each foot; the outer finger of the forearm is immensely elongated for the support of a membranous expansion (the impression of which is preserved in some instances); and the other digits of fore and hind feet terminated in long curved claws. The size and

Pterodactyl.

form of the extremities show that the Pterodactyl was capable of perching on trees, of hanging against perpendicular surfaces, and of standing firmly on the ground, when, with its wings folded, it might crawl on all-fours, or hop like a bird. The famous quarry of lithographic stone at Solenhofen, of Upper Oolite age, has supplied a great variety of these flying lizards; but the largest species have been found in the Secondary beds of this country. In the Upper Greensand, at Cambridge, the remains of a species that must have had a spread of wing of 25 feet across, have been found; and in the Kentish Chalk, another has been met with very little short of this in its dimensions. The various species vary so much in structure as in form, so that the original genus has been lately raised to the position of an order, under the name of *Pterosauria*, and the species have been arranged under the following genera, characterised principally by the structure of the jaw and teeth: *Pterodactylus*, in which the jaws are furnished with long slender teeth along their whole length; *Rhamphorhynchus*, with the extremities of the jaws smooth, probably furnished when living with a horny bill, and towards the bases of the jaws having four or five strong teeth; and *Dimorphodon*, with large strong teeth in front, and small shorter ones behind. Nearly 30 species have altogether been described.

PTEROMYS. See **FLYING SQUIRREL.**

PTEROPODA (Gr. wing-footed), a class of molluscs, having for their only organs of locomotion wing-like fins attached to the sides of the head or neck, one to each side, by which they make their way through the water, flapping them as a bird or an insect does its wings in the air. They are allied to *Gastropoda*, but are inferior to them in organisation; and their wings are not at all homologous to the foot of that class. They are hermaphrodites. The head is perfectly distinct in some, but obscurely distinguished from the body in others. Those which have the head most distinct, as *Clio* (q. v.), have no shell, and form

the order *Gymnosomata*; those with the head indistinct, the order *Thecosomata*, have a thin external shell, which in some is globular, with slots for the wings to pass through, in some triangular and pyramidal, in some conical, in some slipper-shaped, &c. All the species are marine; they are small and delicate creatures, very lively and active, always in quest of food, and affording food to fishes and cetaceans. They are found in all parts of the world, some of them in immense numbers in tropical, and some in arctic seas. None of them are common on the British coast. The genera and species are few.

PTOLEMAIC SYSTEM of Astronomy, so called from Ptolemy (q. v.), its chief expounder, was originated, however, long before his time, and was, in fact, merely an attempt to reduce to a scientific form the common and primitive notions concerning the motions of the heavenly bodies. It was implicitly adopted by Plato, Aristotle, Hipparchus, and (with the exception of the Pythagoreans, and probably of Pythagoras himself) all the eminent physicists and philosophers of ancient times; passing from them to the Byzantines and Arabs, who, especially the latter, were the means of disseminating it through Western Europe, where it continued to be the universally established doctrine till the 16th century. The primary and fundamental doctrines of this system are that the earth is the centre of the universe, and that the heavenly bodies revolve round it in circles, and at a uniform rate. These notions, which are naturally suggested by the first general aspect of things, having, previous to any accurate observation, established themselves as unquestionable axioms, phenomena which were found, on closer examination, to be inconsistent with them, were explained by the introduction of additional hypotheses. The belief that the earth is the centre of the universe, was supported by its being in accordance with the relation of the primary elements of which the material world was supposed to be composed. Thus, earth, the most stable of the elements, held the lowest place, and supported water, the second in order; above water was placed air, and then fire, ether being supposed to extend indefinitely above the others. In or beyond the ether element were certain zones or heavens, each heaven containing an immense crystalline spherical shell, the smallest enclosing the earth and its superincumbent elements, and the larger spheres enclosing the smaller. To each of these spheres was attached a heavenly body, which, by the revolution of the crystalline, was made to move round the earth. The first or innermost sphere was that of the moon, and after it in order came those of Mercury, Venus, the Sun, Mars, Jupiter, Saturn, and the fixed stars, eight in all. To this system, later astronomers added a ninth sphere, the motion of which should produce the precession of the Equinoxes (q. v.), and a tenth, to cause the alternation of day and night. This tenth sphere, or *primum mobile*, was supposed to revolve from east to west in 24 hours, and to carry the others along with it in its motion; but the Ptolemaic astronomers do not venture to explain how this was done, although since the era of motion of the *primum mobile* was that of the equator, its extremities being the poles of the heavens, while that of the ninth sphere was the axis of the ecliptic, some explanation was certainly necessary. As observations of the heavens became increased in accuracy, it was found that the heavenly motions were apparently not uniform, and this was explained as follows: The acceleration of the sun on one side, and retardation on the other side of his orbit, is only apparent, and

Example of the Pteropoda
(*Chondro pyramidalis*).

distinct in some, but obscurely distinguished from the body in others. Those which have the head most distinct, as *Clio* (q. v.), have no shell, and form

some have explained the name Philadelphus, as in irony. By his first wife, he had two sons, Ptolemy, his successor, and Lysimachus; and one daughter, Berenice, married to Antiochus II., king of Syria. He reigned from 285 to 247 B.C.

PTOLEMY III., surnamed **EUERGETES**, succeeded his father Philadelphus, and reigned from 247 to 222 B.C. He made war on the kingdom of Syria, to avenge the death of his sister Berenice, who had been murdered at the instigation of Laodice, former wife of Antiochus. He overran all the provinces as far south as Babylon and Susa; those on the north and east as far as Bactria and India, offered him homage; and he might have extended the bounds of his empire much further, had not domestic troubles compelled him to hasten back to Egypt. The treasures he brought with him were immense; and among the things most highly prized were the statues of the Egyptian gods which Cambyses had carried off to Babylon in 525 B.C. It was the restoration of these to their proper temples which gained for P. the title of Euergetes (the Benefactor). His fleets gained many possessions on the coast of the Mediterranean, such as Pamphylia, Cilicia, and Ionia, which remained for a long time subject to Egypt, though the eastern provinces recently conquered soon returned to their former sovereign. He pushed the limits of the home-empire further south, by conquering part of Ethiopia, where he formed a colony and centre of trade at Adula. P., like his predecessors, patronised learned men, and encouraged the study of the arts and sciences. He added so largely to the library of Alexandria that he has by some been called its founder. Among the celebrated men who adorned his court, and kept up the fame of the 'Museum,' were Apollonius Rhodius, Eratosthenes, and Aristophanes, the grammarian. In his reign, the Egyptian kingdom reached the highest point of military glory, prosperity, and wealth.

PTOLEMY IV., surnamed **PHILOPATOR**, reigned from 222 to 205 B.C. He was the unworthy son of the preceding king. His reign began in blood by the murder of his mother Berenice, his brother Magas, and his uncle Lysimachus; and it ended in blood by the violent death of his wife Arsinoë. He abandoned himself to debauchery, and intrusted the management of his kingdom to favourites. Antiochus, king of Syria, profiting by his indolence, wrested from him in war some of the provinces which his father had gained; but P., at length roused from his lethargy, took the field in person, and defeated Antiochus at the battle of Raphia. When peace was concluded, P. returned to his capital, and plunged with increased zest into every vice and indulgence. He died in 205 B.C.; his death being hastened by his excesses. He followed the example of his father and grandfather in patronising arts and letters, and cultivated friendship with the Romans, to whom he sent large supplies of grain during the second Punic War, but persecuted the Jews, against whom he had conceived a hatred in consequence of being refused admittance to the sanctuary at Jerusalem by the high priest.

PTOLEMY V., **EPIPHANES**, succeeded to the throne of his father Philopator, when only five years of age, and reigned from 205 to 181 B.C. His dominions were invaded by Antiochus, king of Syria, and Philip, king of Macedonia, while he was still an infant, and several provinces were severed from the Egyptian kingdom; but the Romans at length interfered, and peace was concluded, it being arranged that P. should marry Cleopatra, daughter of Antiochus, and receive as her dowry those parts

of his empire in Syria which had been taken from him. He was declared of age in 196 B.C., and his coronation was performed with unusual splendour. The decree published on this occasion is that which forms the inscription on the far-famed Rosetta Stone (q. v.). P. married Cleopatra in 193 B.C. The affairs of the kingdom were managed by the wise and virtuous Aristomenes, and so long as P. followed his counsels, all went well. But the king's ear was gradually opened to insinuations against his great minister, whom he ultimately compelled to drink poison. While P. was preparing for an expedition against Syria, he was poisoned by some of his followers, whom he had alarmed for their own safety. Under him, Egypt rapidly sank in prosperity, power, and reputation.

PTOLEMY VI., **PHILOMETOR**, reigned from 181 to 146 B.C. He was very young at his father's death, and the affairs of the kingdom were therefore directed by his mother Cleopatra, who acted with remarkable prudence and energy. When she died in 173 B.C., the administration fell into the hands of two worthless ministers, Eulaeus and Lensæus, who, engaging in war with Antiochus, brought the kingdom to the brink of ruin. The young king was taken prisoner by Antiochus (170 B.C.), who hoped to obtain possession of the whole of Egypt; but his younger brother, also called Ptolemy, immediately declared himself sovereign under the title of Euergetes II., and took vigorous measures to defend the kingdom. By the intervention of the Romans, Antiochus was compelled to return to his kingdom. The brothers reigned jointly for some time, but at length quarrelled, and a civil war ensued in which Euergetes II. was ultimately worsted. The deputies of the Roman Senate, who now did as they pleased in Egypt, arranged that P. Philometor should retain Egypt proper, while Euergetes II. should obtain Cyrene as a separate sovereignty. This settlement substantially held during the lifetime of the former, P. reigned 35 years, and died in 146 B.C., from injuries received by a fall from his horse in a battle against the Syrian usurper Alexander Balas. He is celebrated for his mild and humane disposition, which was strikingly evinced in his magnanimous treatment of his unworthy brother.

PTOLEMY VII., or **EUERGETES II.**, best known by the nickname **PHYSCON**, or *Big-belly*, ascended the throne after the death of his brother. He married his brother's sister and widow, Cleopatra (who was also his own sister), and on the same day murdered her infant son P. Eupator, whom she had at first declared king. The history of his reign is one unbroken record of murder and blood, whence his subjects nicknamed him *Kakergetes* ('the malefactor'). Not only relatives who stood in his way to the throne, but those who opposed his accession, and even innocent persons, were butchered with savage cruelty. His private vices and debaucheries were equally infamous. He divorced his wife and sister Cleopatra to marry her daughter by her first husband—his own brother; and when temporarily driven from his throne, 130—127 B.C., by the indignation of his subjects, who chose the divorced Cleopatra in his room, the monster took a diabolical revenge by murdering his own and Cleopatra's son, and sending the head and hands as a present to the latter on her birthday. One is almost ashamed to add that he retained the hereditary taste for learning, and patronised learned men. He himself wrote a work of 24 books, called *Mémôires* (*Hypomnēmata*). He reigned from 146 to 117 B.C.

Besides these, there are several Ptolemies of less

PUBLICANI (from Lat. *publicum*, that which is public or belongs to the state), the name given by the Romans to those persons who farmed the public revenues (*vectigalia*). These revenues were put up to auction by the censors, and were 'sold' for a period of five years. They were derived chiefly from tolls, tithes, harbour-duties, *scriptura* (the tax paid for the use of public pasture-lands), mining and salt duties. As the state required the publicani to give security for the sum at which they had purchased the collecting of the taxes, and as this sum was usually much greater than the wealth of any single individual, companies (*societates*) were formed, the members of which took each so many shares and were thus enabled to carry on conjointly undertakings far beyond the capabilities of the separate shareholders. Their contract with the Roman government was made in the name of a single person, who was called *manceps*, and who was held responsible for his *socii* to the state. Every *societas* had also a head-manager (*magister*), who resided at Rome, and transacted all foreign correspondence with the inferior officers who directly superintended the collection of the taxes. In general, a *societas* farmed only one branch of the revenue, but exceptions occur. Only Roman citizens were eligible as publicani, and, as a matter of course, only the wealthiest among these could become such. After the middle of the 2d c. B.C., the farming of the public revenues fell into the hands chiefly of the Equites (q. v.). By a wise regulation, no governor of a Roman province was allowed, during the period of his governorship, to have anything to do with these tax-gathering companies. The design of this was to place the governor in such a position that he could afford to act justly towards the people, who were often cruelly oppressed by the exactions of the provincial underlings—the 'publicans' of the New Testament.

PUBLIC BURDENS is a phrase in Scotch law to denote the usual taxes or charges on land, in respect both of its ownership and possession. Such are the land-tax, minister's stipend, manse assessments, schoolmaster's salary, poor-rates, rogue-money, road and bridge assessments. Public burdens, where no stipulation is made to the contrary, fall upon the landlord, and not on the tenant, except in the case of schoolmaster's salary, which is equally divided between landlord and tenant.

PUBLIC HEALTH ACT is an important act in England regulating sanitary matters (11 and 12 Vict. c. 63). It enabled local boards of health to be created all over England. The initiative was given to one-tenth of the rated inhabitants of cities, boroughs, parishes, and places having a defined boundary, to take proceedings to have the act applied to their district, whereupon and so to deal systematically with sewerage, drainage, water-supply, paving, lighting, watching. The General Board of Health first send an inspector to report, and afterwards direct the act to apply. The act has been further supplemented by a family of kindred acts called the Local Government Acts, the Nuisances Removal Acts, and the Prevention of Diseases Acts. The state of the law produced by these combined statutes is very complicated, but the result is greatly to extend sanitary improvements.

PUBLIC-HOUSES in England are known under two classes, viz. Ale-houses, also called Inns (q. v.), and Beer-houses. The former give board and lodging to travellers, while the latter are mere shops for the sale of beer to be consumed on the premises.—1. An ale-house must be first licensed by the justices, before the keeper of it can sell excisable liquors to be consumed on the premises. The granting of the

licence may be opposed by any inhabitant. The justices' licence is not enough to enable the publican to sell liquors, but it is absolutely essential; and an excise licence must follow, and not precede the justices' licence. The licence is in force for one year; and if any offence or misconduct is committed, the renewal of the licence may be opposed, and refused on the next meeting. The licence compels the keeper to keep unadulterated liquor, to use only legal measures, not to permit drunkenness or unlawful games, or bad characters, to keep good order, and lastly, not to open his house, except to travellers, on Sundays during the morning and afternoon divine service. The law as to the opening of public-houses during Sunday has been altered considerably of late years; but the present state of the law is as follows: no public-house can be opened for the sale of fermented or distilled liquors before half-past 12 at noon on Sunday, or, if the morning divine service is not then terminated, before such termination. It must be again shut between 3 and 5 P.M., and shut altogether at 11 P.M., until 4 A.M. of the following morning. Christmas-day and Good Friday, and public fast or thanksgiving days, are treated as Sundays. The same law applies to beer-houses and all places of public resort where fermented and distilled liquors are sold. Travellers are expressly excepted from the above rule, and the decisions of courts of law have settled the point that a traveller is a person who walks or drives a few miles out of town, whether for pleasure or on business. As regards public-houses, constables have the power of entering them at all times, and it is an offence in the publican to refuse them admission.—2. Beer-houses are subject to the same rules as ale-houses on Sundays. They do not require, however, to be licensed by justices. Any person who can produce a certificate of the overseers that he is the occupier and tenant of a house paying above £8 in the country, or £11 in large towns, and £15 in London of rent, can demand a licence from the excise, which is renewable each 10th of October. A board must be put over the door, and state that it is a licensed beer-house. The keeper of a beer-house can only sell beer, porter, ale, cider, or perry, but not wine or spirits, though he may, if he choose, obtain a separate wine licence. In London, he must close his shop between midnight and 5 A.M. of the next morning; and in towns of at least 2500 inhabitants, at 11 P.M., and elsewhere at 10 P.M. on weekdays. Constables have free access to beer-houses as well as ale-houses. Though beer-houses are thus restricted as to the hour of closing at night, there is no restriction on ale-houses, except on the Sunday night, and therefore ale-house keepers may keep open their houses all the night long on other days of the week, if they think fit. But there was a restriction imposed in 1864 by 27 and 28 Vict. c. 64, whereby all public-houses and refreshment-houses in the metropolitan police-district must be closed between 1 and 4 A.M. Publicans are, as already stated, prohibited from allowing games in their houses; and it has been held that a publican cannot even allow his friends in his own back-parlour, though it is separated from the rest of the house, to practise this gaming, provided it is a game for money. There was a restriction imposed by the Tipping Act, 24 Geo. II. c. 40, on the keepers of ale-houses as regards debts for spirits under 20s., by which they could not recover payment of these small scores; but that enactment was repealed, except only as regards spirits sold to be consumed elsewhere than on the premises, and delivered to the purchaser in less quantities at one time than a quart. So that publicans are still prohibited, by 25 and 26 Vict. c. 38, from suing for debts due for small

puerperal fever, there is an overwhelming amount of evidence, not only that the virus can be carried by the practitioner from one parturient woman to another, but from various other morbid sources; the peculiar condition of childbirth, and possibly certain atmospheric conditions, rendering the mother peculiarly susceptible of such contagion. Numerous series of fatal cases have been traced back to the medical man or nurse having immediately before been in attendance on a case of erysipelas, of sloughing sores, of gangrene, or of typhus fever. It is the opinion of Rokitsansky and others that the morbid matter acquired by the dissection of subjects not dying from this disease, may excite the disease in a patient shortly afterwards delivered by the dissector; and there is no doubt that any one who assists at the *post-mortem* examination of a puerperal patient, becomes, as it were, a focus of intense contagion. Considering the extreme severity and undoubted contagious nature of this disease, the practitioners and nurses who come in contact with it should wash their hands either with a weak solution of chlorine (which has been found of great service in destroying the contagion in the great lying-in hospital at Vienna), or in a solution of chloride of lime, as well as with soap and water. Moreover, persons much engaged in midwifery would do well not to take any part in *post-mortem* examinations, especially when the death resulted from this disease; and when of necessity they are present, they should wear a special dress for the occasion, and take every precaution as to ablution.

Puerperal fever occurs in such varied forms that numerous divisions or species of it have been suggested. The late Dr Gooch, one of the highest authorities on this subject, divided puerperal fever into (1) the *inflammatory* and (2) the *typhoid*; while Dr Robert Lee and Dr Ferguson (two of the highest living authorities) make four divisions.

Inflammatory puerperal fever is most commonly due to peritonitis, but may depend upon inflammation of the uterus, the ovaries and uterine appendages, the uterine veins, &c. The ordinary symptoms, in the most common form (namely, when there is peritonitis), are rigors, followed by heat of skin, thirst, flushed face, quickened pulse, and hurried respiration. The abnormal heat of the skin soon subsides, and is followed by nausea, vomiting, pain in the region of the womb, commencing at one spot, and extending over the abdomen. This pain increases as the inflammation extends, till the patient presents the symptoms described in the article PERITONITIS. The pulse is uniformly high; the tongue coated; the urinary secretion diminished, and often passed with difficulty; while the intellectual faculties are rarely affected. Five or six days are the average duration of this disease, which may prove fatal on the first day, or may extend to ten or eleven days. In some epidemics (as, for example, in Paris, in 1746; in Edinburgh, in 1773; and in Vienna, in 1795), none recovered. Dr Ferguson states, that 'to save two out of three may be termed good practice in an epidemic season.' The treatment so closely resembles that which is required in ordinary acute Peritonitis (q. v.), that

it is unnecessary to enter into any details regarding it.

Typhoid or malignant puerperal fever may commence in various ways, but is always accompanied with fever of a low typhoid character, and with the symptoms which usually are associated with such fever. Treatment is of little or no avail, and the patient usually sinks at the end of a few days, or even hours.

PUERPERAL MANIA comprehends many forms and degrees of mental derangement. In the experience of Esquirol, these forms presented the following proportions: of 92 cases, 49 exhibited symptoms of mania; 35, those of monomania; and 8, those of dementia. The points of agreement between these widely-differing moral phenomena are, that they occur during some stage of child-bearing, and that they can be traced to physical, but not necessarily common physical causes. Insanity is developed either during pregnancy, shortly after parturition, or during nursing. Under whatever circumstances the malady may arise, it is one of exhaustion, debility, and prostration; and this is nearly equally true, whether it be characterised by depression, languor, and passiveness, or by extreme excitement and violence. The latter are the features by which it is generally recognised, and which have justified the name by which it is generally known. The similarity to ordinary frenzy is great: there is the same watchfulness, fury, incoherence, the same vitiation of the secretions, and emaciation; and the chief differences between these affections consist in puerperal insanity being invariably traceable to disturbance of the circulation, or to animal poisoning, and in the short duration of the great majority of cases. The prognosis is, in fact, so favourable, recourse to seclusion in an asylum so painful, that it has been proposed to treat all such cases at home, or that a distinct hospital or sanatorium should be established exclusively for them. When it is stated that a physical cause may be detected in the puerperal condition, this must not be construed as excluding the psychical elements which enter into the production of all such affections. Thus, it was found by Macdonald, that of 66 cases, only 6 could be attributed to a purely physical origin; and that, in the majority, fright, or anxiety, or anger had formed the last or principal of that series of conditions which culminated in alienation. It not merely affects feeble and hysterical females more than others, but in a marked manner those belonging to tainted families. Of 66 patients in the Bloomingdale Asylum, 17 laboured under a hereditary tendency to mental disease. As connected with this point, it may be mentioned that unmarried are more liable to the disease than married women, in the proportion of 11 to 2. This great disparity may partly be explained by the fact, that the fallen and unfortunate are, more than any other class of females, compelled to seek shelter in those institutions from which such statistics are obtained.—Reed on *Symptoms, Causes, and Treatment of Puerperal Insanity*; Marcé, *Folie des Femmes Enceintes, des Nouvelles Accouchées et des Nourrices*.

